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A FEW POINTS OF PRACTICAL IMPORTANCE IN OBSTETRICS, GYNECOLOGY AND ABDOMINAL SURGERY*

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The prodigious advancement made in medicine and surgery during the past forty years has made it impossible for one mind to master every department pertaining to the study and practice of our profession. To be as nearly perfect in one department, and to know as much of each of the other branches as time, talent and circumstances will permit, is all the ablest of us can do.

In this Section our attention is limited to obstetrics, gynecology and abdominal surgery. It takes a capable man to be master of one of these branches, but a far more able man to be master of all three. It is the object of your chairman to dwell briefly on a few important points in each, namely, intestinal stasis, painless operations, Roentgen-ray therapy in gynecology and abdominal surgery, the curative effect of radium, the Percy treatment of inoperable carcinoma uteri, the compromise operations of obstetrics, the treatment of placenta praevia, and surgery in the treatment of puerperal eclampsia.

INTESTINAL STASIS

This is unquestionably one of the most important subjects before the medical profession to-day and it is, to a large extent, for the abdominal surgeon to solve most of the details of this comparatively new phase of an old problem, and to corroborate, as far as possible, the epoch-making work and teachings of Sir Arbuthnot Lane. In his address, delivered at the North-East London Post-Graduate College, Nov. 1, 1913, Lane[1] says:

> By chronic intestinal stasis I mean that the passage of the contents of the intestinal canal is delayed sufficiently long to result in the production, in the small intestine especially, of an excess of toxic material, and in the absorption into the circulation of a greater quantity of poisonous products than the organs which convert and excrete them are able to deal with.
>
> In consequence there exist in the circulation materials which produce degenerative changes in every single tissue of the body or which lower its resisting power against invasion by deleterious organisms.
>
> Perhaps the best scientific confirmatory evidence I can put forward of the harmful effect of defective drainage, both of the body as a whole and of the several tissues which contribute to it, has been afforded recently by the remarkable experiments of Carrel in the growth of living tissue, in which he has shown that tissues are immortal, and grow to the greatest advantage if the drainage of their toxic products is carried out effectually.
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> Owing to unsuitable diet in infancy and to the habitual assumption of the erect position, delay of fecal material takes place in the large bowel, or cesspool, of the gastro-intestinal tract, or, as it can be best described, the "general drainage system of the body." In consequence of this, new membranes or resistances to downward displacement are formed by the crystallization of lines of force upon the surface of the peritoneum along which strain is especially exerted.

Thus he explains the formation of the "bands," "kinks," "folds," "veils" and "membranes" to which his own name and that of Jackson, Treves, Reid and of Jonnesco and Juvara, have been attached. It is the formation of these new structures which explains the occurrence of stricture of the bowels, of appendicitis, of disease of the ovaries, of cancer of the cecum and of the rectum. It further serves to solve the mystery of elongation and dilatation of the duodenum, the spasmodic contraction of the pylorus, the consequent dilatation of the stomach from accumulation of its contents, and the "cardiospasm" of Plummer.

More than this, the changes mentioned above may terminate in ulceration and perforation about the pylorus and lesser curvature of the stomach and even cancer of this organ may result. Or changes may produce infection of the liver and gall-bladder, or lead to the formation of gall-stones, cholecystitis or malignant degeneration.

Other symptoms enumerated by Lane are: the loss of fat; wasting of muscles; degenerative changes in the skin with alteration of its texture and color; the temperature, in uncomplicated cases, is subnormal; stasis always exists in Raynaud's disease; there is mental apathy, stupidity or misery and, occasionally, melancholia or even imbecility and suicidal tendency. Neuralgia and neuritis are frequent; epileptiform tic and headaches are often present; want of control of temper which may lead to misery or even crime. Patients complain of rheumatoid aches and pains in muscles and joints; the thyroid gland wastes; the blood-pressure may be raised or depressed; the breasts show degenerative changes and cancer readily develops in them. Organs prolapse and change in size, shape and weight. The patient becomes short of breath on exertion, resembling asthma; but this may be due to distention of stomach or intestines interfering with the action of the heart. Most of the degenerative changes affecting the heart appear to be due to auto-intoxication. The kidneys may become affected. The hair of the head loses color early and

* Chairman's address, read before the Section on Obstetrics and Gynecology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, June, 1914.

1. Lane, Sir W. Arbuthnot: On Chronic Intestinal Stasis, Brit. Med. Jour., Nov. 1, 1913.

falls out; hair grows in places in which it is ordinarily inconspicuous or absent. The pancreas becomes infected from stasis of the duodenum, resulting in chronic induration, inflammation and finally cancer of this organ. Pancreatic diabetes may ensue. Degenerative diseases of the eye are produced and vary with the degree of auto-intoxication.

According to Lane, the direct changes resulting from the lowered resisting power of the tissues, produced by auto-intoxication, are: infection of the gum, causing pyorrhea alveolaris; tuberculous infection, not produced by direct inoculation; rheumatoid arthritis, which cannot develop except in the presence of defective drainage of the gastro-intestinal tract; infection, directly or indirectly, of the genito-urinary tract, through the blood-stream (by organisms other than tubercle) producing nephritis, cystitis, pyelitis, endometritis, salpingitis, etc.; development of adenomatous tumors in the thyroid gland, or general enlargement of this organ, or of exophthalmic goiter; Still's disease; infections of the skin of a pustular nature; infections of the large intestine by organisms which produce the several varieties of mucous and ulcerative colitis; and ulcerative endocarditis.

Lane states that he has "chosen merely a few obvious, typical, indirect results of the auto-intoxication of chronic intestinal stasis" and that "the point of practical interest . . . is that the drainage scheme be made to work efficiently . . . by mechanical means or by operative interference, and that the resisting power of the tissues of the body is such that they can destroy the organisms or poisons, if not advanced too far or if cancer has not developed;" and, "nothing is more remarkable in the whole range of surgery than the result of the removal of the large bowel in a case of rheumatoid arthritis. The transition is abrupt and startling."

The treatment varies: The non-operative treatment consists in the use of paraffin oil before each meal, the application of a spring support to the abdomen below the umbilicus to keep up the "transverse colon, cecum and other prolapsed viscera," and "to put into the stomach as little food as is likely to decompose and become poisonous in its passage through the intestines."

Operative treatment is resorted to only when the above or other modes of treatment fail and may necessitate the removal of the appendix when it interferes with the lumen of the ileum; or to "short-circuit" the bowel, by dividing the ileum and putting it into the pelvic colon. If the colon is freely movable and pendulous, Lane always removes it down to its junction with the sigmoid; his rule is: *Remove the large bowel, if it may be easily effected, if not, be satisfied with ileocolostomy. Gastro-enterostomy for duodenal distention, even if there is ulceration, is, in Lane's opinion, both unnecessary and harmful. If the ulceration has caused considerable reduction of the lumen of the pylorus, he resorts to gastro-enterostomy. Lane also performs gastro-enterostomy in ulceration of the stomach (in the absence of cancer) in addition to short-circuiting, with or without colectomy. He thus removes the strain from the lesser curve, effectually draining the stomach.*

Those who have carefully studied Lane's work on intestinal stasis, and the case reports of him and his followers, cannot help but be profoundly impressed by the reports of the results obtained from the operations of gastro-enterostomy, ileocolostomy or colectomy, or of all three, whether in the same subject at the same time or at different times. The profession is by no means unanimous in its opinion as to the real necessity of these heroic operative procedures for the relief of chronic intestinal stasis. Deeper delving and further investigations on the part of the internist and the abdominal surgeon alone will solve the problem.

PAINLESS OPERATIONS

Crile's kinetic theory of shock and its prevention through anoci-association[2] has found favor with many surgeons. There are, however, not a few who are averse to Crile's new method. The objections most writers offer are, that the time lost in making the injections of novocain and quinin-urea-hydrochlorid is considerable, that the abdominal walls remain more or less rigid, and that the numerous and extensive injections of both drugs, necessary to anesthetize the field of operation, have a tendency to devitalize the structures involved and thus cause delay in union of the parts as well as create a predisposition to the formation of stitch-hole abscesses. Many admit, however, that "anoci-association" is an ideal and practical method. The most serious operations may be performed without the slightest pain and with total absence of shock, while the clinical results, which Crile and his associates have obtained, leave naught to be desired. In 1908 their mortality was a fraction over 4 per cent.; in the last 1,000 operations (not selected cases) the mortality was reduced to 0.8 per cent. These figures speak for themselves and are deserving of serious consideration.

ROENTGEN-RAY THERAPY IN GYNECOLOGY AND ABDOMINAL SURGERY

Many of our surgeons look on roentgenotherapy as the sovereign remedy in uncomplicated cases of uterine hemorrhages. Since, however, in the opinon of some writers, the cure is obtained solely through the destruction of the ovarian follicles, they caution against the use of the Roentgen rays in young and nervous women. Others maintain that in young women the amenorrhea which follows the application of the Roentgen rays, is only transitory; that a permanent sterilization is almost impossible; that in women near the menopause active follicles are rarely present, and destruction of the ovaries is only a precursor to the climacteric period. The appellation, "Roentgen castration," is therefore, a misnomer and incomparable to surgical castration.

The experience of Bumm, Krönig,[3] Gaus, Döderlein, Kelly, Burnam, and others with the effects of Roentgen rays on fibroid tumors of the uterus show that uterine hemorrhage may be successfully arrested; that, frequently, the tumors diminish in size; occasionally, even a cure may be effected, though not infrequently, the tumors remain as large as before. All agree that a timely myomectomy or hysterectomy yields the most satisfactory result. The administration of the Roentgen rays is limited to those cases in which extirpation of the tumor, or of the uterus, is inadvisable and relief from hemorrhage or other symptoms alone is sought.

2. Crile, George W.: The Kinetic Theory of Shock and Its Prevention through Anoci-Association (Shockless Operation), Cleveland Med. Jour., 1913, xii, 513.

3. Krönig, B.: Die Strahlentherapie in d. Gynäkologie, Strahlentherap., 1913, v, No. 2.

THE CURATIVE EFFECT OF RADIUM

The curative effect of radium on malignant disease has been vigorously assailed. Judging from the good results obtained from radium, mesothorium and the Roentgen rays, in the hands of such men as Krönig, Gaus, Döderlein, Dominici, Kelly, Burnam, Park, Parker Syms,[4] and the Ransohoffs, as well as my observations in my own cases and those of others, the scathing adverse criticism of recent date seems uncalled-for and wholly unjustifiable. Some of the favorable results obtained, especially those from radium and mesothorium, are definite and unmistakable; and while it is, perhaps, too soon to speak of the good achieved with these remedies in terms positive and absolute, it is neither fair nor just to condemn them unqualifiedly.

For the present we know that in all operative cases the knife is the best agent for combating malignant disease; and that radium, mesothorium, as well as the Roentgen ray, have proved of unexpected value in some of the inoperable cases, as well as in some of the superficial forms of cancer. Therefore, it behooves us to encourage the work of those who have occupied themselves with determining the value of these remedies in the treatment of malignant disease.

THE PERCY TREATMENT OF INOPERABLE CARCINOMA UTERI

I feel it obligatory to speak a word in favor of this treatment of inoperable carcinoma uteri. Since witnessing the work of Percy in Chicago last fall, I have had an opportunity of seeing two cases of inoperable cancer of the uterus.

In one, Mrs. X, aged 48, coming into my care Nov. 15, 1913, the actual cautery (Percy method without opening the abdominal cavity) was used five different times at intervals of one week, two weeks and four weeks. At the end of that time only a small portion of the body of the uterus remained, and the vagina with the region formerly occupied by the cervix and lower uterine segment, appeared perfectly healthy, but an offensive watery vaginal discharge continued. The patient then received, at intervals of one week, three applications of radium (80 mg.) by Dr. Louis Ransohoff. The result was most marked and highly satisfactory. What there was left of indurated tissue in the vaginal vault, tenderness of the parts and of offensive discharge, disappeared promptly; the patient gained rapidly in weight, and is to-day, so far as the eye can see and the finger can feel, in every respect a healthy woman. Within the last seven weeks she has gained 20 pounds.

The other, Mrs. Y., aged 35, was first seen about the middle of March. This, too, was an inoperable case of carcinoma uteri. Up to this time the Percy method (not opening the abdomen) has been employed three times with, apparently, the same satisfactory results as in the first case. She is now ready for the radium treatment.

THE COMPROMISE OPERATIONS OF OBSTETRICS: THE INDUCTION OF PREMATURE LABOR, THE USE OF THE HIGH FORCEPS, VERSION AND EMBRYOTOMY ON THE LIVING CHILD

In considering the so-called compromise operations, my sole object is to awaken an interest in the new therapy of narrow and contracted pelvis which, after the doctrine of narrow pelvis had been formulated by Litzmann and Michaelis of Kiel, has been so beautifully worked out by German obstetricians. Briefly stated, this new treatment consists of the test of labor, hebosteotomy, symphyseotomy, or abdominal cesarean section.

The hope has been expressed that the induction of premature labor, the application of the high forceps to a floating head above the pelvic brim, version, or embryotomy on a living child, might be, eventually, eliminated from obstetric practice. This hope has been realized only to a limited extent.

The induction of premature labor is to-day as popular in England as ever and is more favored in some parts of Germany. The high forceps continues, more or less, in favor in France and in this country, and version still enjoys well-deserved popularity. Aseptic midwifery and a more intelligent care of the premature infant have considerably reduced the maternal as well as fetal mortality of artificial labor. Asepsis in the use of high forceps or version has also been of value, though the maternal and fetal mortality has not, thereby, been markedly reduced.

The application of forceps to a freely floating head above the pelvic inlet, or to a head which will not engage, but steadily remains above the brim, is, with the knowledge of to-day, no longer considered good practice. A judicious perseverance in the use of high forceps in cases in which the os is fully dilated, the membranes ruptured and the head fixed at the inlet, is justifiable; but great care must be exercised to avoid injury to the child's head and damage to the soft parts of the mother. Prolonged and violent traction on the head, and the repeated introduction of the forceps by the same attendant or by different operators, cannot be too severely condemned.

Embryotomy on a living child can be regarded as justifiable only in cases of excessive hydrocephalus, extensive spina bifida, double monsters or when the fetal head is impacted in the pelvis and the child's life already seriously endangered, or when there is risk of rupture of the uterus, as in a case of impacted shoulder with excessive attenuation of the lower uterine segment and marked retraction of the contracted fundus. In most of these cases, version is impossible without rupture of the uterus.

Version is justifiable only in those instances in which the head is fixed on the brim of the pelvis, the mother's soft parts are uninjured, the uterus not overdistended, and a reasonable trial of the forceps have failed to deliver. (Early external, or combined version on the head or feet, as in transverse or oblique presentations, is not included here.)

The new therapy of narrow pelvis means: Send your patient to a hospital before labor begins, and give her the benefit of the test-of-labor; if this fails, perform hebosteotomy or, if need be, cesarean section. Under this management 80 per cent. of more than 30,000 patients with narrow pelvis have delivered themselves spontaneously; 15 per cent. of the patients have required hebosteotomy, and in only 5 per cent. was a cesarean section necessary. In all the maternal mortality was 0.1 per cent., and the fetal mortality about 4 per cent.

THE TREATMENT OF PLACENTA PRAEVIA

This is still an open question. Those who advocate abdominal cesarean section in every case of placenta praevia are as mistaken as those who will not admit

4. Syms, Parker: The Prevention and Cure of Cancer, New York State Med. Jour., May, 1913.

that hysterotomy is ever necessary in this condition. The great majority of cases of placenta praevia, it is true, may be favorably treated by the use of the tampon, the rubber dilator, version or slow extraction of the child, so far as the mother is concerned. Not so with the child; the majority, or at least a very large percentage, of the children perish under this treatment. In my opinion abdominal hysterotomy is indicated in every case of placenta praevia in which the hemorrhage cannot be controlled, no matter what the condition of the cervix, the character of the child's presentation or the location of placental implantation. Thus, if the placenta has developed normally, the hemorrhage from a placenta praevia centralis may be readily controlled if the os is dilatable, and the presentation vertex or breech; but hemorrhage may be difficult or impossible of control in a case of placenta praevia lateralis, marginalis or partialis, if the placenta is abnormally developed (for instance when the chorionic villi have penetrated the muscularis) and when, in connection with this condition, the cervix is elongated or the os very rigid, and the presentation of the child such that a correctly placed tampon or the insertion of a rubber balloon will neither control the loss of blood, nor cause obliteration of the cervix or dilatation of the os. Of those obstetricians who put so much stress on the importance of the life of the child when advocating cesarean section for eclampsia, yet strenuously argue against cesarean section in the treatment of certain forms of placenta praevia, permit me to ask: Is not the life of the child to be considered as much, and even more, in cases of placenta praevia than in eclampsia? The child delivered through the abdomen in a case of placenta praevia has a far better chance for life than one born in the same manner in eclampsia.

THE MERITS OF SURGERY IN THE MANAGEMENT OF PUERPERAL ECLAMPSIA

In a recently published paper on eclampsia, read in New York,[5] we read the following: "The practitioner who seeks to learn from medical literature how the toxemias of pregnancy are best treated, may well feel that he has authority for the most radical treatment on the one hand and for shameful neglect of the patient's interest on the other."

In April, 1913, two papers on the treatment of eclampsia were read before the New York State Medical Society. One advocated vaginal cesarean section as one of the methods of emptying the uterus in the treatment of this disease, and the other maintained that the medical care of puerperal convulsions has given the best results, so far as the mother is concerned.

The writer of the more recently published article refers to these two papers as follows:

> Any one reading those two papers on eclampsia would be in serious doubt as to how to treat a case of toxemia, because he is told on the one hand that the only real hope for the eclamptic patient lies in the immediate emptying of the uterus, *although a number will die in spite of this treatment*, and on the other hand he is assured that the only safe method of treatment of eclampsia is by purely medical means, *though a certain number of patients, approximately the same, will be lost by following this method*.[6]

The author of the paper of recent date, just referred to, does not quote a single sentence from either paper to which he alludes. This we may readily pardon; but when, carelessly or wilfully, misrepresentation is added to seemingly specious argument, it must be corrected. Personally, I welcome and always respectfully consider the severest criticism, and, as this subject is of the greatest importance to child-bearing women, I regard it as my solemn duty to make the correction on this most auspicious occasion.

The author in question states that *"approximately the same number of patients die" when treated by "purely medical means" as when subjected to "the immediate emptying of the uterus."* In my paper, to which this writer unquestionably refers, conclusive proof is furnished that, under strictly medical treatment, the collective maternal mortality is really less than 13 per cent., and that the most favorable statistics of the maternal mortality of eclampsia, when surgical means have been employed, do not fall below 28 per cent. No effort is made to prove my statements incorrect; and yet this writer has the temerity to state in the same paper that *"the published results of a large number of cases"* (of eclampsia) *"in which the abdominal cesarean section has been performed, show that the maternal mortality runs somewhere between 40 and 50 per cent."*[6]

My own paper[7] on eclampsia, read at Rochester before the New York State Medical Society, in 1913, is an earnest protest against the immediate emptying of the uterus after the first convulsion, or the indiscriminate performance of cesarean section, to the exclusion of every other means, for the relief of puerperal toxemia. The arguments brought forth in my paper have not been refuted, and I reiterate: *Up to the present time, we have no better means of combating puerperal eclampsia than by the hypodermatic use of large doses of veratrum viride, free saline catharsis, hot baths or packs, strict milk diet and, if the patient be in labor, to facilitate its progress with or without the aid of the forceps or version on the feet.* Seeing is believing. Try this treatment and you will be convinced! Let us seek triumph only in truth!

Peterson's[8] last paper on abdominal cesarean section for eclampsia, appeared in the last issue of the *American Journal of Obstetrics*. Like all of his literary efforts, this paper again reveals his enormous capacity for work, and that he has plenty of time in which to do it. In this paper he furnishes the statistical evidence that the maternal mortality of puerperal eclampsia may be reduced to a little less than 13 per cent. when abdominal cesarean section is performed early; in other words, the maternal mortality of this disease can be made as low with abdominal hysterotomy as when treated by purely medical means.

For the sake of argument, and for the sake of argument only, this statement is accepted. It alone is sufficient to demonstrate that Peterson has, virtually, solved the problem in favor of the medical treatment of eclampsia. Who will now advocate abdominal cesarean section in every case of puerperal convulsions, if the same—and even better results—can be obtained with medical care?

4 West Seventh Street.

5. Bull. New York Lying-In Hosp., January, 1914.
6. Italics my own.
7. Zinke, E. Gustav: A Critical Review of the Medical and Surgical Treatment of Puerperal Eclampsia, Am. Jour. Obstet., 1913, lxvii, No. 6.
8. Peterson, Reuben: A Critical Review of 500 Published and Unpublished Cases of Abdominal Cesarean Section for Eclampsia, Am. Jour. of Obst., June, 1914.

NEWER POINTS OF VIEW REGARDING THE PART PLAYED BY DIFFERENT FOOD SUBSTANCES IN NUTRITION *

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For the continued performance of their physiologic functions and for the maintenance of their material integrity, living organisms are dependent on an adequate supply of suitable nutrients. Their needs in this respect are evidently not uniform at all times. Periods of growth and development, of convalescence and repair, determine special requirements that are not encountered at other epochs in the life-cycle, just as rest and activity alternate in making unlike demands on the organism during the routine of each day. It was realized, long ago, that these varied manifestations of the bodily mechanism may create specific demands in respect to the food substances; but it was a forlorn hope to expect to penetrate far into the mysteries of nutrition until some definite and fairly comprehensive knowledge regarding the chemical make-up of the products taken into the body as food had been unveiled. An elementary understanding of the fate of the fats and carbohydrates came earliest, because these foodstuffs were the first to have their chemical constitution unraveled. The story of the metabolism of the protein substances is only now beginning to keep pace with the newer knowledge of the structure of these highly complex nitrogenous compounds, and there are chapters bearing on numerous other factors in the food intake — on the place of the inorganic salts, the lipoids and diverse accessory features in the dietary — that still remain to be written even in their broadest outlines.

To speak of "newer" points of view regarding the rôle of the different food substances in nutrition, as I am expected to do, implies a contrast of to-day with yesterday in this progressive domain of physiology. One need not turn back far to reach the days of Liebig, to whom, above all others, are due the beginnings of present-day knowledge of the constitution of foods, tissues and excreta. In Moleschott's popular "Physiologie der Nahrungsmittel," published in 1859, the chief concern of nutrition was portrayed as the production of good blood. He wrote:

> One of the foremost questions which humanity will always address to the physician, is how good, healthy blood, capable of development, can be attained. And, modify the inquiry as they will, all those who are concerned therewith are forced by experience to admit, whether it be frankly or with reserve, that our thoughts and our loves, our children and our powers depend on our blood—and our blood on food.

Accordingly, Moleschott further maintained that vigorous nutrition is the consequence of efficient formation of blood; so far as the latter process means an enrichment of the circulating fluid in protein substances, the vigorous nutrition would express itself, above all, in the muscular tissues. "The more meats, legumes and cereals are consumed and digested," says Moleschott, "the plumper are the muscles, the firmer their fibers, the more powerful their action." Other diets, of rice, or vegetables, or fish, were pictured as leading to an enfeebled musculature. For the fats and carbohydrates there were known depots other than the muscles. Not until the work of Carl Voit was the principle of nitrogenous equilibrium definitely established for the animal body.

The vague and indefinite generalizations of a generation ago in respect to the functions of the foodstuffs have slowly been transformed into the more tangible theories and suggestive hypotheses of the passing decade. To give you some more concrete ideas of what these changes have involved I may refer to the teaching current in my own student days, more particularly as it is related to nitrogenous metabolism. Sir Michael Foster wrote in 1891: "At all events the greater part of the proteid material of the food enters the blood as proteid material, either as peptone or in some other form, and is carried as proteid material to the tissues." The latest dictum respecting this phase of absorption presents an entirely different point of view. Proteins are now understood to be disintegrated in the digestive tract into relatively simple nitrogenous fragments, the amino-acids, not exceeding twenty in number. It is these digestion products, absorbed into the blood-stream and now demonstrated beyond peradventure to be present there, that represent the real form in which the protein intake of the body is transported throughout the organism. Protein metabolism has at length become essentially a question of the behavior of amino-acids in the body — their uses and fate.

So far as the nitrogenous transformations are concerned, the amino-acids are the center of interest in nutrition, the pivot about which the modern conceptions turn. For him who would understand the real significance of the proteins in the functions of the organism there is no escape from the necessity of appreciating clearly the nature of the amino-acids — those derivatives which arise when, either in the laboratory of the chemist or in the alimentary processes of digestion, albuminous substances are disintegrated. A generation ago it was the superficial distinctions between animal and vegetable proteins, between albumins and globulins and albuminoids that formed the basis for discussions of relative nutritive merit. To-day we are more concerned with the question whether this or that protein, whatever its biologic origin, will yield the characteristic, desired amino-acids, such as tyrosin and tryptophan, leucin and lysin, glycocoll and cystin, histidin and arginin. Our attention is fixed on the building-stones or units out of which the great protein structures are put together.

Instead of referring to the proteins in terms of their physical properties or empirical composition — their content of carbon, hydrogen, oxygen, nitrogen or sulphur — at least so far as the problems of nutrition are involved, the time has arrived for estimating their behavior in the organism on the basis of the quota of each of about eighteen well-defined amino-acids which the individual representatives of this group of foodstuffs can yield. Most, if not all, of these amino-acids are essential for the construction of tissue and the regeneration of cellular losses. In proportion as any specific protein can furnish these constructive units it may satisfy the nutritive needs of the body. The efficiency of the individual protein in this respect must depend on the minimum of any indispensable amino-

* Read at the joint meeting of the Section on Practice of Medicine and the Section on Pathology and Physiology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

acid that it will yield; for it is now known that some of them cannot be synthesized anew by the animal organism. If, for example, a protein or mixture of proteins comparatively deficient in their yield of the sulphur-containing amino-acid cystin be furnished alone to supply the body's nitrogenous requirement, the production of new, cystin-yielding molecules of protein will be limited by the amount which is available in the diet. An excess need not be wasted, for it can be burned up like sugar or fat to provide energy; but new construction or growth is limited by the minimum of the essential unit.

Although a supply of all or most of the characteristic amino-acids derived from typical proteins is essential for the construction of new tissue or the repair of the old, it by no means follows that all of them are inevitably needed in the ordinary function of maintenance, that aspect of nutrition characterized by the preservation of unchanged body-weight in the adult from day to day. Nevertheless, certain amino-acids are absolutely indispensable even in maintenance. This is well shown in recent observations conducted by Osborne and myself under the auspices of the Carnegie Institution of Washington. We have succeeded in keeping small animals (albino rats) during long periods on mixtures of isolated protein, fats, carbohydrates and inorganic salts as they are present in the protein-free fractions of milk. The advantage of this experimental procedure lies in the fact that it is possible to test, as we have done, the nutrient efficacy of individual proteins. The upshot of our now extensive experience has been to demonstrate pronounced differences in proteins from different sources. Some, like the proteins of milk, the edestin of hemp-seed, the albumin of egg-white, are individually capable of satisfying the nitrogenous needs of the body at all stages of its development. Chemical analysis has disclosed the potential existence of most of the familiar amino-acid groups in each of these protein complexes. When the gliadin of wheat, a prominent protein of this seed, is fed as the sole protein, adult animals are suitably maintained; but growing animals cease to increase in body-weight, remaining in nutritive equilibrium without growth, unless the amino-acid lysin $CH_2.CH_2.CH_2.CH_2.CH.COOH$ (NH_2 NH_2) is added to the gliadin-food. Thereupon growth is promptly resumed. The explanation becomes apparent in the fact that gliadin is almost entirely devoid of the lysin radical; and inasmuch as this is obviously needed for new protein construction, growth cannot proceed until the missing unit is supplied. Again, zein, the most conspicuous protein of the maize kernel, fails to yield either lysin or tryptophan $C_9H_8(C{-}CH_2.CH.COOH)(CH)(NH_2)(NH)$ or glycocoll $CH_2(NH_2)COOH$ and accordingly is entirely inadequate to meet the nitrogenous needs of animals in respect to either maintenance or growth. It may be fed in the greatest abundance; yet the animals decline in health unless the zein is supplemented by some more perfect protein. If the amino-acid tryptophan is added to the imperfect maize protein, maintenance of body-weight, without growth, is promptly established. Evidently tryptophan is indispensable for some physiologic function quite apart from increase in tissue substance. If both tryptophan and lysin are added to the zein, the diet thereupon becomes suitable for growth. In glycocoll, likewise missing in zein as in several other proteins, we have an instance of an amino-acid which can undoubtedly be manufactured when it is needed. From these facts it is apparent how essential certain amino-acids are in the nutritive processes and how unable the body is to synthesize some of these anew.

I trust that this hasty review has given emphasis to the contention that the problem of protein metabolism has largely become one of amino-acid supply. Provided only that they are rendered free and available by the digestive processes, the body cares little whence its amino-acids are obtained. Meat proteins, egg proteins, cereal proteins—all serve in the same sense. Indeed, the amino-acids themselves, isolated in the chemical laboratory, appear to be equally available. We begin to understand why a diet largely made up of corn with its abundance of the imperfect zein and its relative poverty in more complete proteins may be poorly suited for growing individuals; why corn is so advantageously supplemented by a little skimmed milk with its casein and lactalbumin; why gelatin, which does not yield tyrosin, tryptophan or cystin, fails by itself to meet the demands of the body for nitrogenous pabulum; why a low intake of a suitable protein may be infinitely more advantageous to nutrition than a surfeit of an "incomplete" protein.

Nor is the story of the rise of the physiology of the amino-acids ended here. These compounds furnish a superior medium for the growth of bacteria, not infrequently yielding products of pronounced toxicity or pharmacologic potency. A series of amins ranging from simple forms to complex types owe their origin to the action of micro-organisms on proteins, both outside of the body and within the alimentary tract. Putrescin, cadaverin, tyramin, histamin are derived from the amino-acids arginin, lysin, tyrosin and histidin, respectively. Likewise the widely vaunted alimentary offenders, indol and skatol, are chargeable to the putrefaction of the tryptophan group in the protein molecule; phenol and cresol are similarly derived from tyrosin. Thus many of that vague and heterogeneous collection of compounds once convincingly included in the indefinite expression "ptomains" are doubtless nothing else than the fragments of amino-acids that have fallen sacrifice to bacteria before they could be absorbed intact into the blood-stream. Now that the production of these more or less toxic amins and alcohols is clearly referable to the action of known types of bacteria on individual amino-acids, the way to avert the malaise or more serious consequences with which the putrefaction products are so often charged may be a step nearer. Gelatin, for example, furnishes no tryptophan, tyrosin or cystin; the intestinal bacteria are therefore unable to liberate indol, phenol, hydrogen sulphid or mercaptans from it.

To still another domain the discovery of the amino-acid structure of the proteins has admitted fresh rays of light. The phenomena of immunity, creating almost an entire new science of immunology; the precipitin reactions; anaphylaxis and its varied manifestations—all of these point to the participation of proteins; and, what is more significant, owing to the highly specific character of the responses, they postulate the existence of individual proteins in numbers far exceeding the possibilities suggested by the ordinary criteria of individuality. How are we to conceive of a hundred

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or a thousand specific albumins from as many tissues and individuals? We need merely grasp the convenient hypothesis furnished by our knowledge of the amino-acids which they yield. Assuming that ten different amino-acid derivatives are united even without duplication to form a single protein, mathematical calculation indicates the possibility of over three million different combinations; for eighteen amino-acids the possible combinations have been estimated to exceed millions of millions. In the face of such figures one realizes what specificity may really mean when thousands of structurally isomeric compounds can theoretically, at least, yield precisely the same proportions of the same amino-acids and yet remain distinct in respect to the relative arrangement of their constituent units. The development of an almost innumerable number of special enzymes, as suggested by Abderhalden's recent studies now widely applied in serodiagnosis, likewise finds the possibility of an explanation in what has just been noted. A thousand structures may require a thousand different keys to unlock them.

It might be illuminating to dwell further on other consequences entailed by the development of the biochemistry of the amino-acids; but we must return again to the physiology of two decades ago for a reminder of other changes that have been wrought by the hands of progress. Urea was, of course, recognized as the predominant excretory end-product of nitrogenous metabolism. Its history was difficult to follow, and almost entirely obscured. Foster voiced a then current belief in his widely studied text-book in suggesting that a large portion of the urea leaving the body by the urine is formed from the creatin of the muscle, though the objections to such a theory were already obvious to him. The normal presence of creatinin in the urine offered a difficulty which was not entirely solved by charging its origin to creatin ingested as meat. Nor was only creatinin left as a source of confusion. Uric acid and other excreted products remained to be accounted for, as they occurred in varying amounts in the urine.

Foster wrote:

> Urea is the chief end-product of proteid metabolism, but that end is probably reached in several ways; so that probably a very large number of nitrogenous chemical substances make a momentary appearance in the body. Some of these fail to become urea, and either without or after further change make their appearance in the urine. But we do not know whether their appearance is accidental, the result of imperfect chemical machinery; or whether they, though small in quantity, serve some special ends in the economy. Perhaps sometimes, or with some of them it is the one case, at other times or with others it is the other case. . . . The evidence as far as it goes tends to show that the metabolism of proteid is very complex and varied, that a large number of nitrogen-holding substances make a momentary appearance in the body, taking origin at this or that step in the downward stairs of catabolic metabolism and changing into something else at the next step, and that the presence in various parts of the body and even in the urine, in small quantities, of so many varied nitrogenous crystalline substances, forming a large part of what are known as extractives, has to do with this varied metabolism. Possibly the transformations by which nitrogen thus passes downward take place to a certain extent in such organs as the liver and the spleen, which are remarkably rich in these extractives. But the whole story of proteid metabolism consists at present mostly of guesses and of gaps.

In this veil of mystery that surrounds the chemical transformations of the food-substances in the body there are today many rifts through which new truths have been brought to light. Uric acid is no longer associated with the metabolism of the simple proteins, but is recognized as the excretory end-product of the purins, a group of compounds distributed widely in nature, either free or combined as they are in the nucleoproteins of cellular tissues. By the exclusion of glandular material, like liver and sweetbreads, and of meat with its free hypoxanthin, the dietitian can reduce the production and output of uric acid in man at will. Here is one of the striking instances of where, through the newer knowledge of foods and metabolism, the physician has become a master of the chemical performances of the organism. The creatinin of the urine, provided that it is not reinforced by ingested precursors in meat, represents a story of the inner workings of the organism quite independent of the protein in the diet. The ammonia output is in a measure an index of the overproduction of acids in the body. Although by no means the only regulatory device whereby the neutrality of the blood and tissues is maintained in health, ammonia is nevertheless automatically furnished in conspicuous amounts when it becomes necessary to offset an impending acidosis. Hitherto the therapeutic procedure in such cases has been to furnish an alkali, commonly sodium bicarbonate, and thereby conserve the available supply of bases in the body from depletion. Recent studies have shown that a similar contribution of bases is afforded by a judicious selection of the dietary. There are foods which act as potential acids and others which function as bases in the organism. When burned up either in the laboratory or in the body-cells, they leave a preponderance of acid or base, as the case may be, in their ash. In this respect potatoes, apples, raisins, and cantaloupe, for example, are base-forming foods which depress the output of ammonia and increase the solubility of uric acid in the urine, as the experiments of Dr. Blatherwick in our laboratory have demonstrated; whereas meats, cereals and prunes (the latter with their content of benzoic acid) furnish acids in preponderance. Milk is intermediate in this respect. From the point of view here raised it is quite easy to accomplish as much with a liberal allowance of certain selected foods as with half an ounce of the familiar bicarbonate. To do this, however, implies that the physician must become as well acquainted with the properties of the foods as he appears to be with such novelties as amboceptors and complement, polyvalent vaccines and immune serums, salvarsan and epinephrin.

Turning attention to another group, the fats, the question must have arisen in the minds of many a physician as to why certain representatives of these foodstuffs have so long maintained a reputation for superior merit in connection with nutrition. There are several fluid fats which are quite as available, or even more easily procurable than is cod-liver oil. Yet this product continues to enjoy a vogue that cannot be dismissed as the mere result of advertising propaganda. Cod-liver oil was a favorite, particularly in the dietotherapy of children, long before the present era of catch-phrase circulars and illuminated billboards. Its supposed unique virtues have called forth varied attempts at explanation. At one time it was the trace of iodin found in cod-liver oil which was

believed to endow it with superiority over other fats like cottonseed oil and olive-oil having essentially the same physical properties and the same mixtures of glycerids, or fats proper. When this explanation no longer appeared tenable, the superior value of cod-liver oil was attributed to its ready digestibility. Lately Osborne and I have observed an unexpected efficiency in the product which is not shared by many other fats of similar superficial properties. We have fed growing animals (albino rats) on mixtures of isolated food substances including an abundance of fat in the form of commercial lard until, owing to the lack of some essential and as yet unknown ingredient of adequate dietaries, growth was checked. The replacement of a portion of the lard in the diet by cod-liver oil invariably brings prompt restoration of growth which continues uninterrupted until the adult stage is reached. Butter-fat and egg-yolk fat likewise contain a "growth-promoting" ingredient which appears to be more or less completely wanting in other dietary fats of both animal and vegetable origin. There is, for example, a marked difference between lard and the fat elaborated by the mammary gland. Whereas our experimental animals show symptoms of malnutrition with a cessation of growth and decline in weight at the end of three months on a diet including lard as the sole fatty ingredient, when either butter-fat or cod-liver oil were used there was no sign whatever of failure after a year or more of uninterrupted feeding on the same diet day after day.

It is well known that all of the naturally occurring fats, such as have just been mentioned, are complex mixtures of true fats in the chemical sense, along with other substances including lipoids, pigments and compounds more soluble in fat than in the watery mediums of the body. The lipoids, in particular—cholesterol, lecithins, cephalins — have come into prominence in connection with various reactions involved in serum diagnosis and such phenomena as hemolysis, narcosis and absorption. Though long recognized as a constituent of the nervous tissues and certain pathologic products such as gall-stones, cholesterol has remained a compound of unknown function until very recent times. At the present moment the consensus of opinion appears to be that cholesterol is not ordinarily formed within the organism of the higher animals, and that these are dependent on the food intake to maintain the essential supply thereof. If this be true the ultimate source must reside in constructive plants; and assuming occasional losses from the body, doubtless with the feces, the store of cholesterol can be kept intact in man only by renewal from a suitable dietary. Ordinarily, in the adult living on a ration of products derived from many sources, no difficulty arises, because compounds of the cholesterol type are widely distributed and presumably found in all cells; but it is quite conceivable that in individuals like growing children or patients living on a diet restricted in character a real deficiency of cholesterol may ensue. It is known that the hemolytic phenomena of the red blood-cells are related to their lipoid content; and the therapy of the future may find a place for such substances as cholesterol, kephalin, etc., in the management of hemolytic anemias and other pathologic manifestations. Here, again, the intricacies of the diet cannot be overlooked by the intelligent physician of the future.

I have dwelt somewhat on the possibilities in respect to cholesterol and the growth-promoting components of milk-fat, egg-fat and cod-liver fat because it affords an opportunity to emphasize the hitherto largely unappreciated importance of factors in nutrition which cannot be expressed in terms of the familiar protein, fat and carbohydrate or in calories of energy. These factors may be inorganic in some cases, as is instanced by the reputed rôle of iodin and the wide distribution and alleged significance of manganese, boron, silicon and other elements in animal tissues; they are frequently organic in character. To class these varied factors together under the euphonius designation of "vitamins," as has lately been done, does not render less obscure the deficiencies which the absence of them from the diet may entail; nor does it give any clue to the mechanism whereby growth may be promoted, metabolism stimulated, or deficiency diseases engendered. Not only in those admitted instances of diet deficiencies such as beriberi and scorbutus, but also in numerous other clinical and experimental types of malnutrition there is need for further research. The proverbial adherence of the medical profession to dogmatic statement must be changed. Its members must become eager to take up the current views, study the underlying data as well as they can, and watch the consequences. Let us welcome the day when the food market and the kitchen are taken into consideration by the physician as seriously as are the apothecary's shop and the fashionable spas.

If in all the foregoing little mention has been made of the carbohydrates in nutrition, it has been because, in a general way, more has been known about them for a longer time than is true of the other nutrients. Even among the carbohydrates the principle of specificity comes into play. The physiologic carbohydrates are the six-carbon sugars, such as glucose, levulose and galactose. Unless an ingested carbohydrate can be converted into this simple type of sugar in the alimentary tract, its nutritive value is distinctly impaired or entirely lost. For this reason, all attempts to introduce more complex sugars, dextrins or starches directly into the blood-stream, for prompt distribution to the tissues which need them, have failed. In experiments conducted in our laboratory, animals have received subcutaneous or intraperitoneal injections of cane-sugar or milk-sugar for weeks and months without acquiring the capacity to utilize so little as a single gram introduced in this way in an undigested form. Carbohydrates like inulin and the galactan of agar-agar or of Irish moss can furnish no energy to the human organism because it is unable to digest them, that is, to convert them into simple sugars. The possibility of nourishing an individual in some way other than by the oral path evidently depends on introducing the nutrients in the form of those units—the amino-acids, simple sugars and fats—which normally constitute the actual pabulum of the hungry cells.

Physiology has borrowed its methods largely from the sciences of physics and chemistry. It also has a fruitful method of its own, that of experiments on animals and man. None of these procedures can be dispensed with. They corroborate and supplement each other, and they serve to test the hypotheses which give the impetus to progress. The medical profession must insist on conserving for the physiologic sciences the opportunity to continue its studies untrammeled by the passing prejudices of those who fail to appreciate its motives.

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INTERMEDIARY PROTEIN METABOLISM *

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The subdivision of protein metabolism into intermediary metabolism and tissue metabolism indicates that we to-day are in possession of a much more detailed and accurate knowledge concerning animal metabolism than was available a few years ago. The controversy between Voit and Pflüger and their followers of the past generation as to whether the protein of the food must be incorporated in the protoplasm of the tissues before it is oxidized was an unprofitable and useless controversy, because it was too far in advance of the experimental knowledge of that period. We still do not know the spatial relationship between protoplasm and food materials at the moment of oxidation. On the other hand, we no longer speak of protein metabolism as being an oxidation process at all in the sense understood by Pflüger and Voit. While protein materials like other carbonaceous food materials are of course finally oxidized in the body, we now believe that the nitrogenous foodstuffs first undergo changes and chemical transformations involving the loss of all protein characteristics before they are completely destroyed by the oxidation processes involved in the production of heat and energy. Through the investigations of Kutscher (1898), and more recently of Abderhalden and his associates, it has been made clear that protein materials are completely decomposed into simple crystallizable products, the amino-acids, as a result of digestion. This discovery is fundamentally important for it has necessitated a complete revision of the earlier ideas and doctrines as to the nature of the metabolic processes involved in the utilization of protein as food. The old, burning question as to whether protein must be incorporated in the living tissue protoplasm before it is oxidized we now know was a false question, because the food protein has been altered beyond recognition even before it leaves the digestive tract and many of us no longer believe that protein as such is ever oxidized in the body.

The discovery that protein materials are split up into the simplest possible component parts during the digestion suggested two new fields for metabolism investigations. The first of these is the question as to whether simple amino-acids can be substituted for ordinary food protein, and which if any of the amino-acids are most indispensable for the maintenance of the animal organism. Much interest and important work has been done in this field, and it has become quite clear that some amino-acids are indispensable while others appear to be less necessary constituents of the food. The importance of all these data to the science of metabolism, if not to medicine, is self-evident in view of the fact that practically all the amino-acids can be manufactured. The second metabolism problem which required renewed investigations when the deep-seated character of protein digestion became clear concerns the subsequent history of the digestion products, and inasmuch as my own investigations lie in this field, I shall confine myself to a discussion of this problem.

* Read before the joint meeting of the Section on Practice of Medicine and the Section on Pathology and Physiology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, June, 1914.

Formerly it was generally believed that protein materials were but little altered by the digestion, and the protein of the food was supposed to pass into the blood-stream without any material alteration. Since no peptones were found in the blood the peptones formed during the digestion were supposed to be regenerated into more complex albuminous materials while passing through the mucous membrane of the intestinal wall just as fatty acids and glycerin are believed to be transformed into neutral fats during the absorption. This hypothesis seemed plausible, because it agreed with the experimental observations and because the animal organism was supposed to be dependent on the complex kind of proteins found in the blood. Many investigators, including Kutscher and Abderhalden, adhered to this explanation of what happens to the nitrogenous food in the intestinal wall even after it became certain that amino-acids and not peptones were the chief end-products of the digestion. Many physiologists, however, abandoned the protein regeneration hypothesis about ten years ago. To them it seemed highly improbable that the proteins should first be completely split up into amino-acids only to be immediately recombined into albumin and then again immediately broken down so as to give the urea, the elimination of which is greatly increased three or four hours after the intake of protein food.

In place of the protein regeneration hypothesis these dissenting physiologists assumed that the transformations of nitrogenous materials which take place in the intestinal wall are of a destructive rather than of a constructive character. Just as the digestive ferments convert the proteins into amino-acids within the digestive tract, so by a continuation of the digestive or hydrolytic processes most of the amino-acids immediately lose their nitrogen while passing through the intestinal wall and the liver. The prompt formation of urea, the supposedly large amount of ammonia in the portal blood, and many other features of the nitrogen metabolism were explained in a fairly plausible fashion by this hypothesis.

There remained, however, another possibility, namely, that the intestinal wall does nothing to the amino-acids but simply lets them through. From a theoretical aspect, this point of view has been the most plausible, and notwithstanding numerous early failures, the efforts to prove that the amino-acids are absorbed from the intestine without change have been continued, and now there is no longer any doubt about the fact that the end-products of protein digestion, the amino-acids, are quickly and easily absorbed. In fact, the speed of the absorption and the speed with which the amino-acids are distributed to all the different tissues in the body is one of the reasons why the earlier investigators failed to find the digestion products in the blood.

By means of the quantitative colorimetric methods devised in my laboratory, by means of Van Slyke's micro method, and by means of Abderhalden's qualitative ninhydrin test it is now easy to show that the amino-acids are absorbed. We have therefore now not the slightest reason for believing that the amino-acids formed during the digestion undergo any change while passing through the walls of the intestine.

The essentials of the story of protein digestion and absorption appear to be very clear indeed, and can be stated in two or three sentences. In the stomach the greater part of the protein is dissolved and much of it is converted into albumoses and peptones. In the

intestine the dissolved products as well as the remaining undissolved residues are attacked by the trypsin and are thereby split up into amino-acids. The intestinal wall yields another ferment, erepsin, which, so to speak, prevents the absorption of albumoses and peptones by converting such as may escape the action of the trypsin into amino-acids — and the amino-acids as fast as they are formed are absorbed and transported by the blood to all parts of the body.

The absorption of amino-acids from the blood by the different tissues and organs is extraordinarily rapid, but is not complete. The communication between the blood and the tissues appears to be about equally good in either direction, and the accumulations of the nitrogenous digestion products in the blood and in the tissues reach therefore substantially the same level. This is, I think, true for the nitrogenous waste-products as well as for the digestion products, and if correct is important, for it means that by analyses of the blood we determine also the concentration or accumulation of the same products in the tissues.

The speed of the absorption is not the same for all tissues. The liver, for example, according to Van Slyke, absorbs amino-acids from the blood more rapidly than do the muscles even when the amino-acids are injected into the general circulation, and similar though smaller variations will doubtless be found in the speed of absorption revealed by different muscles; but such variations are probably only temporary, so that on the whole it will be found true, I think, that the concentration of a given nitrogenous product in the blood is the same as in such general tissues as the muscles.

In view of the established fact that the muscles absorb the greater part of the amino-acids coming from the digestive tract, it is no longer permissible to regard the liver as the chief seat of the urea formation. The greater part of the urea formation represents nothing but the removal of the nitrogen from amino-acids which are not needed for the rebuilding of new tissue material, and there is in my judgment no reason to doubt that the muscles which absorb the greater part of the amino-acids also form from them the greater part of the urea. Dr. Denis and myself have repeatedly emphasized this point of view, and recent studies made in the Harvard Medical School by Drs. Fiske and Sumner on the urea formation have clearly indicated that this process is not localized in the liver.

In its broad outlines the intermediary protein metabolism appears now comparatively simple and clear. The blood gets amino-acids from the digestive tract and all the tissues get them from the blood. From the amino-acid mixtures thus received each tissue rebuilds itself, and the amino-acids which are not needed for such synthesis are converted into urea and carbonaceous remainders. The latter are either converted into carbohydrates or are otherwise oxidized for the production of heat and energy. When protein materials from within the body are broken down, as in fasting and in fevers, these are in all probability digested in the tissues down to the stage of amino-acids, and from that stage on undergo the same transformations as do the amino-acids derived from the food.

According to this view it is to be noted that the specialization of functions which characterizes the higher animals does not extend very far into the field of general protein metabolism. All the tissues probably take part in this process roughly in proportion to the weight of living protoplasm contained in them. We cannot therefore expect to find the general protein metabolism materially or specifically altered because of this or that disease in any particular organ. I feel it incumbent on me to emphasize this aspect of the case, for we laboratory workers are often expected to elucidate diseases by metabolism studies when no such elucidation is possible on the basis of the available fund of knowledge of metabolism processes.

THE SPECIFIC DYNAMIC ACTION OF THE FOODSTUFFS *

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The conclusions to be reported in this paper are based on results obtained from 250 experiments on dogs. The animals rested quietly in a respiration calorimeter, at an environmental temperature of 26 C. (78.8 F.), and were subjected to different dietary conditions. Under these circumstances the simplest nutritional elements can be given and their effect on the heat production can be noted in hourly periods. This gives an idea of the interplay between the nutrient particles and the oxidizing tissues.

Dr. Du Bois will present the story from the point of view of investigations made with a similar though larger respiration calorimeter devised to determine the nutritional condition of the human being in disease.

All nutrient proteins, starches and compound sugars undergo fragmentation in the intestinal tract into simple chemical substances which are soluble in the fluids of the body. A polysaccharid like starch is broken up into glucose molecules; a disaccharid like cane-sugar (sucrose) is split into a molecule each of glucose and fructose, and lactose undergoes similar transformation into a molecule of glucose and one of galactose. Glucose, fructose and galactose are sugars which may be absorbed and carried to the living cells by the blood-current that bathes them. In similar fashion, the protein molecule is demolished in the intestine and broken into units such as glycocoll (amino-acetic acid), alanin (aminopropionic acid), glutamic acid, which is a dibasic amino-acid with five carbon atoms, and there are many others. These amino-acids are absorbed into the blood-stream and are carried to all the living cells of the body.

The result of the ingestion of food in any quantity is to increase the amount of heat production in the body. The extent to which the increase in metabolism occurs depends not only on the quantity, but also on the kind of food introduced into the blood-stream. Since the power to increase heat production exerted by protein, carbohydrate and fat is different for each substance, Rubner has defined this power as the specific dynamic action of the substance. The term is technical and cumbersome, yet the meaning is perfectly simple.

Every one has experienced the increased feeling of warmth after a hearty meal, and no one eats largely of meat in midsummer, for it increases heat production and consequently increases sweating.

* Read before the joint meeting of the Section on the Practice of Medicine and the Section on Pathology and Physiology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, June, 1914.

† From the Physiological Laboratory of the Cornell University Medical College, New York.

The reason why the various foodstuffs increase heat production has not been entirely clear and it is this somewhat complicated problem with which the present paper deals.

In the first place, the increase in the heat production has nothing whatever to do with the increase in intestinal activity (*Darmarbeit*), a theory advocated by Zuntz; for the heat production is not increased by the ingestion of insoluble substances like bones or agar-agar, of saline cathartics even with the production of violent intestinal movements, or of Liebig's extract, which stimulates the glands to secretion. Likewise, incombustible substances such as urea and sodium chlorid when given in health, and glucose when given in diabetes, may be absorbed, carried in the blood-stream and eliminated in the urine without causing an increase in the oxidative processes. These facts have been established by Rubner, by Benedict and by others.

When, therefore, the heat production of a dog rises 30 or 40 per cent. after glucose has been given, and even 90 per cent. after a large quantity of meat, it is evident that the cause of the specific heat production must lie, not within the absorptive or excretive mechanisms, but in the interplay between the living cells and the nutrient material, the sugars and amino-acids contained in the blood.

To determine the effect of sugars and amino-acids, experiments have been devised in which a dog was given a standard maintenance diet every evening, and eighteen hours thereafter, when the gastro-intestinal tract was free from food, the *basal metabolism* was measured. In Dog 3, on which eighty-two experiments have been performed, the basal metabolism was determined at different intervals and averaged 16.7 calories per hour. It scarcely varied from this during a period of nearly three months.

The effect of a substance to be tested was measured by giving it eighteen hours after the standard diet and noting the change which took place from the normal basal metabolism.

THE METABOLISM OF CARBOHYDRATES

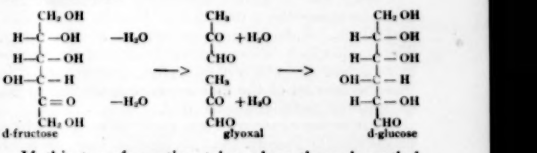
After 50 gm. of glucose the heat production rose in one of the hourly periods to a maximum of 32 per cent. above the basal level. After 70 gm. of glucose a maximum rise was 38 per cent. With 50 gm. of fructose a similar rise was 44 per cent. and with 50 gm. of sucrose one of 48 per cent. Here then are very large increases. It has been shown on another occasion that 50 gm. of glucose are absorbed into the blood and disappear from the gastro-intestinal canal from three to four hours after its administration. At first the sugar-content of the blood increases, but then quickly falls to its normal percentage as the blood becomes more dilute, the latter fact being indicated by a fall in hemoglobin percentage. This greater volume of blood bears a greater number of readily diffusible molecules of sugar to the active tissues of the body. Following the end of the absorption of glucose, the kidney eliminates a large volume of the water which has caused the dilution of the blood, hemoglobin returns to its normal percentage, and the composition of the blood is again regulated by the liver and other organs through which it flows. In consequence of this, the heat production of the fourth or fifth hours after the ingestion of glucose regains the level of the basal metabolism. Those older experiments, which were performed during twenty-four-hour periods, do not show the very great temporary rise in metabolism after glucose ingestion, since calculations based on a long interval of time give no idea of the real state of affairs. Grafe's recent work on dogs which were overfed on carbohydrates throughout the day shows large increases in metabolism, as high as 33 per cent. above the level of an eighth day of fasting. This is fully explained in the light of the results given above.

But what is the cause of the increased heat production after the ingestion of sugar? On a former occasion I stated that it was due to the mass action of the sugar-molecules reacting with the living cells.

One might argue that this increased heat production is due to a breaking up of sugar in the inert fluids of the body and not in the cells themselves. An analogy is found in the living yeast-cell in which the greater part of the destruction of sugar is accomplished within the cell, itself, and a minor part in the surrounding fluid (Rubner). Recent work, however, has shown that the blood-plasma contains no glycolytic enzymes and cannot accomplish the breakdown of sugar.

Another explanation is offered by F. G. Benedict, who declares that acids formed in the intermediary metabolism of sugar are stimuli to increased metabolism. In substantiation of this, Benedict cites an instance of increased heat production following the administration of 100 gm. of fructose to a diabetic patient, by whom this sugar was not oxidized, but in whom it was converted into glucose and eliminated in the urine. Benedict interprets this as due to the breaking up of fructose into acid and other radicals which are subsequently synthesized into glucose. Modern theory indicates that methylglyoxal is the principal intermediary substance in this transformation. Benedict's experiment was of such interest that it has been repeated, using phlorhizinized dogs, but it could not be confirmed. The diabetic animal did not oxidize the fructose; it also transformed fructose into glucose, but the metabolism was in no way increased.

The transformation of glucose into levulose may thus be written:



If this transformation takes place through methyl glyoxal, which is also believed to be an early metabolism product of glucose, then when a molecule of glucose breaks and forms two molecules of methyl glyoxal, these small three-carbon aldehyd radicals cannot, through their presence, place metabolism on a higher level. But through their mass action on the living cell, the oxidative processes involved in their destruction may cause metabolism to reach this higher level. This is the metabolism of plethora.

Experiments have also been made with alcohol alone and with alcohol and 50 gm. of glucose. When 9.4 gm. of alcohol were given alone, the heat production of the dog was increased 10 per cent. When alcohol was given with glucose the heat production was raised above the level to which glucose alone would have caused it to rise, and alcohol was oxidized in preference to carbohydrate as shown by a marked depression of the respiratory quotient. Here the alcohol, with

its small molecule containing only two carbon atoms, proved to be the more available fuel.

METABOLISM OF AMINO-ACIDS

Dakin states that nine of the seventeen amino-acids which make up the composition of protein yield glucose when they are broken up in the body. Glycocoll with two carbon atoms and alanin with three are completely convertible into glucose, and the ammonia produced in this transformation forms ammonium carbonate in the blood, which, in turn, is converted into urea. These reactions are *endothermic*, that is to say, heat is absorbed in order to produce sugar and urea. In the transformation of 20 gm. of glycocoll into 16 gm. of glucose and 8 gm. of urea 17.1 calories are absorbed. When 20 gm. of alanin undergo this transformation, 3.6 calories are required. The amino-acid known as glutamic acid contains five carbon atoms, three of which are convertible into glucose. These three amino-acids have been extensively used in the experiments to be described, which were devised in order to interpret the cause of the very great increase in the heat production which follows the ingestion of meat.

A striking point is that if 20 gm. of glutamic acid be given to a dog there is no increase whatever in the heat production of the animal. Twenty gm. of glutamic acid yield 13 gm. of sugar which, of itself, is too small to increase the production of heat. This amino-acid which is convertible into sugar and urea may be given without appreciable change in the heat production. If, however, 20 gm. of glycocoll be given, a very great increase in heat production follows. The higher metabolism lasts for seven hours. Twenty gm. of glycocoll containing 40 available calories increases the heat production by 30 calories during this period. This is greater than the 17 calories absorbed in the intermediary production of sugar and urea. Ten gm. of glycocoll produce just half the effect which 20 gm. accomplish.

Twenty gm. of alanin, containing 73 available calories, increases the production of heat by 20 calories, and 30 gm. of alanin cause an increase of 30 calories. The result which follows administration of the amino-acids is like that which occurs after meat ingestion, in that the amount of the increase is proportional to the quantity of material metabolized.

What is the cause of these great increases in heat production? Twenty gm. of glucose may have no effect whatever on the heat production, and 70 gm. may cause an increase of 20 calories, yet 20 gm. of glycocoll, which is convertible into only 16 gm. of glucose, raise the heat production by 30 calories, a height that 70 gm. of glucose cannot bring about.

What is the reason?

At the International Congress of Hygiene and Demography, held in Washington, I presented the view that it was due to the stimulation of the protoplasm to higher activity through the mass action of accumulated amino-acids. Folin had shown that amino-acids were quickly absorbed and were retained by the tissues, and he believed that their metabolism was of slow development, none taking place in the first hour. Experiments which have since been instituted have led me to believe that the highest heat production is coincident with the highest metabolism of amino-acids and that the amino-acids themselves do not lie in the tissues without being involved in a highly active metabolism. A year ago, Miss Wishart performed experiments on dogs killed in the height of excessive protein digestion, and failed to find any great increase in the quantity of non-protein nitrogen in the muscles. Another convincing reason of the rapidity of the metabolism of amino-acids, such as glycocoll and alanin, lies in the speed with which Csonka found that the sugar derived from them is eliminated in phlorhizin glycosuria. If 20 gm. of glycocoll be administered to a diabetic dog, 16 per cent. of the sugar derivable from it is eliminated in the urine of the first hour. At the end of five hours, 86 per cent. of the sugar which could be derived from glycocoll metabolism has been eliminated. The elimination of the sugar is almost as rapid as when a comparable quantity of glucose is given to the dog. The point to be emphasized is that this method of determining the rapidity of the metabolism of glycocoll and alanin shows that the early hours of their highest metabolism is coincident with the maximum increase in the production of heat within the dog after their ingestion.

After all, might not the great rise in metabolism be due to the oxidation of glycocoll or alanin as so much refuse which cannot be used as fuel for the cells? To determine this, glycocoll and alanin were given to the dog in the diabetic condition and the metabolism was measured. The heat production rose in both instances. Since the amino-acids were not oxidized but were eliminated as sugar and urea in the urine, the increased heat production must have been due either to the stimulus exerted by them on the living protoplasm or to the stimulation produced by the oxy- or keto-acids formed from them during their transformation into sugar.

That specific intermediary acids formed in metabolism are the real stimuli is indicated by the fact, first shown by Rubner, that when ingested protein is reconstructed into body protein the amino-acids involved in this reaction do not cause an increase in the heat production.

It does not seem probable, however, that this stimulation is induced by all acids, for the strong dibasic glutamic acid is without effect. It may be that lactic acid derived from alanin and subsequently converted into glucose is an effective stimulus, whereas methyl glyoxal, which is a problematic cleavage product of glutamic acid and is convertible into sugar, may not be an effective stimulus to higher oxidation.

In phosphorus poisoning, which is accompanied by formation of lactic acid, the total heat production is above the normal, although a high protein metabolism may here also be an accessory factor. In high altitudes, where lactic acid is always produced, metabolism increases.

The rise in heat production in diabetes may be partly induced by the great increase of fat in the blood and by the increased protein metabolism and not entirely by the diabetic acidosis as suggested by Benedict. For, in the dog, diabetic acidosis plays a very subsidiary part and yet an increase in the metabolism of the fasting phlorhizinized animal of 75 per cent. above the level of the basal metabolism has been noted.

Even though the cause of the increased heat production after protein ingestion be due largely to a stimulation caused by the presence of certain oxy- or keto-acids, yet the metabolism induced thereby can be defined as the metabolism due to amino-acid stimulation, to contrast it with the metabolism due to

plethora in the presence of food molecules in abundance.

In conclusion, it may be stated that living cells metabolize carbohydrates and fats in increased quantity when these are present in large amounts in the surrounding fluid, and that they are also stimulated to a higher heat production during the metabolism of certain amino-acids to an extent which is entirely out of proportion to the energy value of those amino-acids, and which may indeed be independent of their energy value.

THE TOTAL ENERGY REQUIREMENT IN DISEASE

AS DETERMINED BY CALORIMETRIC OBSERVATIONS*

EUGENE F. DU BOIS, M.D.
NEW YORK

The total energy requirement of an individual is represented by his heat production or, in other words, his total metabolism. If food of a total caloric value equaling the heat production be taken, the normal man will remain in nutritive balance. As a rule, the appetite in health regulates the intake to a nicety, although some of us need the guiding influence of the bathroom scales and the restraining influence of tight clothes. In disease, on the other hand, the appetite is no index of the requirement and the nutrition of the cells is at the mercy of the physician. Likewise, the stomach and kidneys are at his mercy, and he must regulate the diet so that it will nourish the cells without throwing too much work on damaged organs or oxidative functions of the body. It is often just as important to know the proper dosage of foods as to know the proper dosage of drugs.

The most satisfactory instrument for measuring the heat production is the respiration calorimeter[1] of the type devised by Atwater and Rosa in Middletown, Connecticut. Such a calorimeter, modified for clinical purposes, has been constructed by the Russell Sage Institute of Pathology in the wards of the Second Medical Division of Bellevue Hospital. Since its completion a year and a half ago, it has been used in 142 observations. A number of normal controls have been studied, but most of the subjects have been patients from the adjoining metabolism ward in which all diets are weighed and analyzed. This ward is under the control of the institute and those in charge of the calorimeter.

On the morning of the observation a patient, usually without his breakfast, is placed within the calorimeter where he remains for three or four hours. He finds himself on a comfortable bed in a well-ventilated box about the size of the lower berth of a sleeping-car. He can amuse himself by looking out of the windows, but since the scenery is monotonous he usually dozes for about half the time and allows his mind to vegetate for the other half. Absolute rest is essential, and the only movements permitted are those connected with turning in bed from time to time. All such movements are registered automatically by a device which is delicate enough to record even the small amount of work done by a man in stroking his mustache.

As the subject lies in the calorimeter the oxidation of the various foodstuffs within his tissues produces a certain amount of heat each hour. Approximately three-fourths of this heat leaves the surface of the body by means of radiation and conduction. This heat is removed from the calorimeter by a system of cooling pipes and is accurately measured by electrical thermometers. About one-fourth of the heat is removed from the body by the vaporization of water from skin and lungs. This water vapor is caught and measured in a sulphuric acid bottle.

If the body temperature should rise, it is obvious that some of the heat produced would be stored in the body itself and not eliminated. The estimation of this heat in short periods is a matter of great technical difficulty since the changes in rectal temperature, which are recorded every four minutes by means of a very accurate electrical thermometer, may not represent the average temperature changes of the body. Other thermometers strapped in the axillae and on the surface of the thorax or abdomen demonstrate

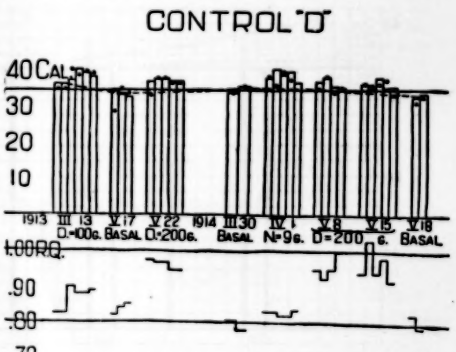


Chart 1.—Control D. Showing the basal metabolism in hourly periods and the effects of food in increasing the heat production. Each column represents the calories per square meter of body surface as determined by the method of indirect calorimetry. The round dot represents the calories as measured by the method of direct calorimetry. *D* stands for glucose; *N*, nitrogen in the form of casein and egg albumin. These were taken approximately one hour before start of observation except on March 13, 1913, when the glucose was taken after the basal metabolism had been determined in two one-hour periods.

that the different parts of the body show temperature curves which are by no means parallel, and that one part of the body may even be cooling while another part is warming. If the body temperature of a man of average size rises 0.5 degree centigrade it means that from 25 to 30 calories have been stored in the body in addition to the calories eliminated from the body. Such large changes, amounting to one-fourth or one-third of the total heat production for an hour, have been observed within an hour, and it is obvious that any inaccuracy in the determination of the average body temperature causes an error in the method of direct calorimetry. While the error may be large in a single hourly period, it becomes very small in an observation lasting three or four hours and seldom exceeds 5 per cent.

The heat production is measured not only by this method of direct calorimetry but also by the more

* Read before the Section on Practice of Medicine and the Section on Pathology and Physiology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* From the Russell Sage Institute of Pathology in affiliation with the Second Medical Division of Bellevue Hospital.

1. Atwater and Rosa: Description of a New Respiration Calorimeter. 1899, Bull. 63, U. S. Dept. of Agr. Benedict and Carpenter: Respiration Calorimeter for Studying the Respiratory Exchange and Energy Transformations of Man. Carnegie Instit. Wash., 1910, Pub. 123.

accurate method of indirect calorimetry. The box is ventilated by a rotary fan which sucks the air out of one end of the chamber, drives it through a bottle of sulphuric acid to remove all moisture, then through a bottle of soda lime to remove the carbon dioxid and finally returns the same air, absolutely pure and odorless, to the other end of the calorimeter. As the patient uses up oxygen, this gas is supplied automatically from a small tank. By weighing these various bottles and tanks at the beginning and end of each hour it is a simple matter to determine the carbon dioxid produced and the oxygen consumed. Knowing the relative proportions of these and also the nitrogen of the urine one is able to calculate with great accuracy the grams of protein, fat and carbohydrate oxidized by the patient during that hour. Knowing the heat produced by the oxidation of 1 gm. of each of these substances it becomes a simple matter to calculate the total heat production.

The two methods of direct and indirect calorimetry agree within 5 per cent. in about three-fourths of the experiments, and in many cases the figures are almost identical as is shown in Chart 1, that of one of the hours after the last meal. It will be seen in Chart 2 that if we express the metabolism in terms of calories per square meters of the body surface per hour, the results will group themselves close to the average figure of 34.2 irrespective of the body-weight. The dotted line represents the average of forty-nine normal controls studied by various types of apparatus in many laboratories. It is evident that the level is the same for persons whose weights are between 40 and 50 kg. (from 88 to 110 pounds) as for those whose weights are between 60 and 70 kg. (from 132 to 154 pounds). On the other hand, if we express the results in terms of calories per kilogram per day we have a line of averages which falls steadily as the weight increases. In order to have a single base-line which need not be changed for persons of varying weights we therefore compare all our results with the average normal figure of 34.2 calories per square meter per hour.

While the metabolism of a given individual remains fairly constant for years, there may be a variation among normal men of 10 per cent. above or 10 per cent. below the average. Further study will perhaps show even a greater variation. The metabolism is

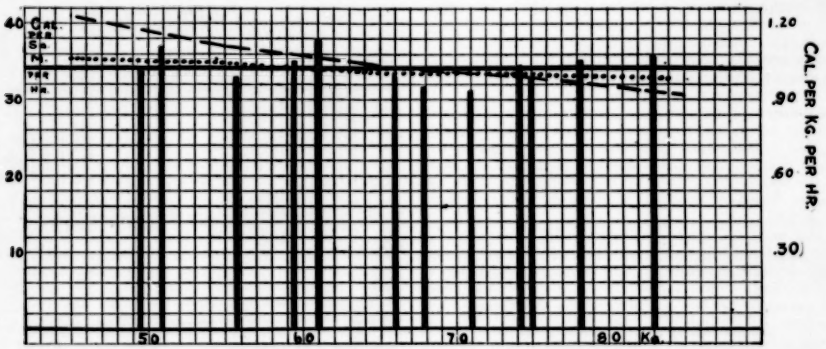


Chart 2.—Basal metabolism of normal men from fourteen to sixteen hours after the last meal. Columns represent calories per square meter per hour produced by subjects in bed calorimeter. Horizontal line drawn at 34.2, the average. Interrupted lines represent averages of 49 normal controls studied with various types of respiration apparatus, arranged in five groups according to weight. Dotted line shows the results expressed according to surface area. Dash line represents the same 49 controls with the results expressed in terms of calories per kilogram per day.

normal controls. In the total of all the experiments so far calculated, involving the measurement of 23,000 calories, the two methods agree within 1.6 per cent. As yet no disease has been found in our somewhat limited series of observations in which there is any consistent disagreement between the two methods. This is a matter of considerable import, since the previous work in the study of the heat production in disease has been done almost exclusively by the method of indirect calorimetry. The agreement of the two methods shows that the calculations by indirect calorimetry have not been vitiated by any profound and unsuspected changes in the intermediary metabolism.

It is comparatively easy to determine the total metabolism but difficult to find the exact normal figure with which to compare the results. We have measured the basal heat-production of a number of normal persons of varying weights and have grouped them with the normal controls examined by Benedict in his bed calorimeter, all determinations being made on individuals at complete rest, from fourteen to sixteen hours after the last meal. It will be seen in Chart 2 that if we express the metabolism in terms of calories per square meters of the body surface per hour, the results will group themselves close to the average figure of 34.2 irrespective of the body-weight. The dotted line represents the average of forty-nine normal controls studied by various types of apparatus in many laboratories. It is evident that the level is the same for persons whose weights are between 40 and 50 kg. (from 88 to 110 pounds) as for those whose weights are between 60 and 70 kg. (from 132 to 154 pounds). On the other hand, if we express the results in terms of calories per kilogram per day we have a line of averages which falls steadily as the weight increases. In order to have a single base-line which need not be changed for persons of varying weights we therefore compare all our results with the average normal figure of 34.2 calories per square meter per hour.

While the metabolism of a given individual remains fairly constant for years, there may be a variation among normal men of 10 per cent. above or 10 per cent. below the average. Further study will perhaps show even a greater variation. The metabolism is increased in childhood, diminished in old age, and probably depends, to a great extent, on the nutrition of the body and the mass of active protoplasm. Nevertheless, Rubner's law that the metabolism of different individuals and different species of animals is proportional to surface area does hold good within certain limits. These limits may be wide when we try to compare the metabolism of babies, guinea-pigs, athletes and fat men, but, as we have shown above, the limits are narrow for a group of men of approximately normal build.

Voit and Rubner demonstrated the fact that the taking of food raised the heat production, and the term of specific dynamic action was applied to this phenomenon. The cause of this was little understood until Lusk[2] studied the matter in great detail, making hourly determination of the heat production of dogs in the small Cornell calorimeter. His work on dogs

2. Lusk: Animal Calorimetry, Papers II, III, V, VI, Jour. Biol. Chem., 1912, xii, 349; xiii, 27, 155, 185; Cause of the Specific Dynamic Action of Protein, Arch. Int. Med., December, 1913, p. 485; The Specific Dynamic Action of the Foodstuffs, this issue, p. 824.

has been duplicated on normal men as nearly as the human stomach will permit, but, of necessity, the amounts of food are relatively smaller and the increases in heat production distinctly less marked. Chart 1 shows the basal metabolism of control D and the effects of glucose and protein meals. The increase after glucose amounts to from 8 to 10 per cent. and after protein to 12 per cent.

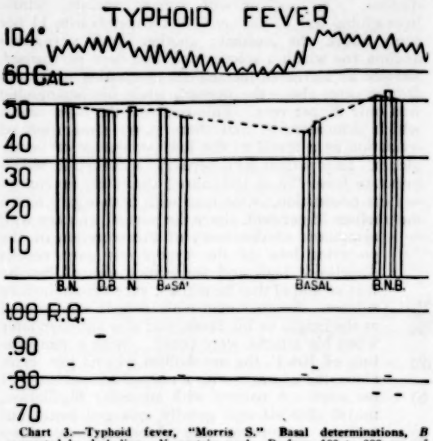


Chart 3.—Typhoid fever, "Morris S." Basal determinations, *B* connected by dash line. *N*, protein meal. *D*, from 100 to 200 gm. of glucose. Results expressed in averages.

Since the time of Voit and Pettenkofer a great deal of work has been done on the subject of the respiratory metabolism and total heat production in disease. Magnus-Levy[3] established the fact that in exophthalmic goiter the energy requirement was greatly increased even to a point as high as from 50 to 70 per cent. above the normal and showed that in cretinism and myxedema the heat production might be as low as from 45 to 50 per cent. below the normal. Kraus,[4] Grafe,[5] Rolly[6] and others demonstrated that in typhoid fever the metabolism was raised to from 30 to 40 per cent. above the normal. Grafe[7] has recently shown that the heat production is low in certain stuporous conditions and increased in lymphatic leukemia and cancer. The total heat production in diabetes has been studied by many observers with varying results, but Benedict and Joslin,[8] using the calorimeters in Boston, have shown that in cases of severe diabetes with acidosis there is an increase in metabolism.

The study of the metabolism in typhoid fever and the effects of the high-calory diet was begun in Bellevue Hospital in 1911 in association with Dr. Warren Coleman. The small Benedict apparatus was used and the calculations were made according to the method of indirect calorimetry. A summary of the results will be presented by Dr. Coleman[9] in another Section but it may be stated that the heat production of the patients was not raised by the administration of large amounts of food during the height of the fever. The matter seemed so important that it demanded investigation by the use of the calorimeter.

Observations were therefore made on nine typhoid patients during the course of the fever and convalescence. The first part of the results on one patient, who was in the calorimeter twenty-two times, is shown in Chart 3. This patient enjoyed the work with the calorimeter. His original infection was by no means mild and he had one relapse which was severe and a second relapse which scarcely interrupted a rapid convalescence. Throughout the disease he was so well nourished that his weight remained practically constant.

It will be noticed that during the fever his total metabolism was from 40 to 50 per cent. above the average normal and that it was scarcely increased at all on the days when the observations were made shortly after the ingestion of 100 gm. of glucose or 64 gm. of protein. A study of the nitrogen in the urine in this and three other cases shows that the percentage of calories derived from protein during fever when the patients were fasting was seldom raised above the upper normal limit of 20 per cent., although one patient early in his disease derived 28 per cent. of the calories from protein.

As the temperature falls the total metabolism diminishes and the percentage of calories derived from protein drops to 10 or 15 per cent. During convalescence heat production may be from 20 to 30 per cent. above normal, and at this stage glucose and protein exert as great a specific dynamic action as in health.

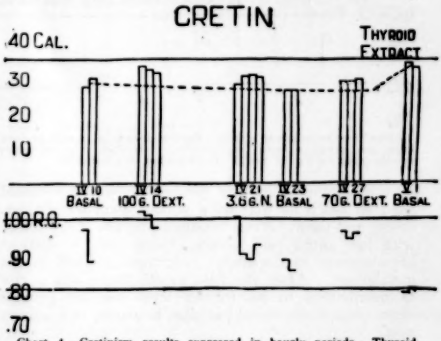


Chart 4.—Cretinism results expressed in hourly periods. Thyroid-extract treatment begun two days before last observation.

The diseases of the thyroid gland have been studied with particular interest since the level of the total metabolism seems to be the best index of the activity of the thyroid secretion. In one cretin who was 36 years old but had the mental and physical development of a child of 8, the total energy requirement was from

3. Magnus-Levy: Gaswechsel bei Thyroiden, Berl. klin. Wchnschr., 1895, xxxii, 650; Ueber Myxödema, Ztschr. f. klin. Med., 1904, lii, 201.

4. Kraus, Fr.: Ueber den respiratorischen Gasaustausch im Fieber, Ztschr. f. klin. Med., 1890, xvi, 160.

5. Grafe: Untersuchungen über den Stoff- und Kraftwechsel im Fieber, Deutsch. Arch. f. klin. Med., 1911, ci, 209.

6. Rolly: Experimentelle Untersuchungen über den Stoffwechsel im Fieber und in der Rekonvalescenz, Deutsch. Arch. f. klin. Med., 1911, ciii, 93.

7. Grafe: Beiträge zur Kenntniss der Stoffwechselverlangsamung bei stuprösen Zuständen, Deutsch. Arch. f. klin. Med., 1911, cii, 15; Die Steigerung des Stoffwechsels bei chronische Leukaemie und ihre Ursachen, Deutsch. Arch. f. klin. Med., 1911, cii, 406; Das Verhalten von Gesamtstoffwechsel und Eiweissumsatz bei Karzinomatösen, Deutsch. med. Wchnschr., 1914, xl, 518.

8. Benedict and Joslin: Metabolism in Diabetes Mellitus, Carnegie Inst. Wash., 1910, Pub. 136; A Study of Metabolism in Severe Diabetes, 1912, ibid, Pub. No. 176.

9. Coleman, W.: The Effects of Food on Metabolism in Typhoid Fever, read in the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

18 to 25 per cent. above the normal but was raised almost to the normal on the third day of treatment with thyroid extract (Chart 4). The specific dynamic action of food was normal in this patient.

A series of seven patients with exophthalmic goiter were studied before and after treatment in an effort to guide the therapeusis in this disease, which is remarkable for the number of "remedies" that do not give relief. Luckily we were able to show some beneficial effects of treatment, although good results were obtained by rest and careful feeding alone. One patient, who had shown moderately severe symptoms for one year, was studied over a considerable period of time. If we look at the results as expressed in Chart 5, we notice that, in marked contrast to the cretin, the metabolism is 80 per cent. above the normal, falling to 60 per cent. on rest and good food. Von Noorden[10] has stated that the specific dynamic action of food and especially of meat is increased in fever and in exophthalmic goiter. We have seen that this was not the case in fever and it was evidently not true

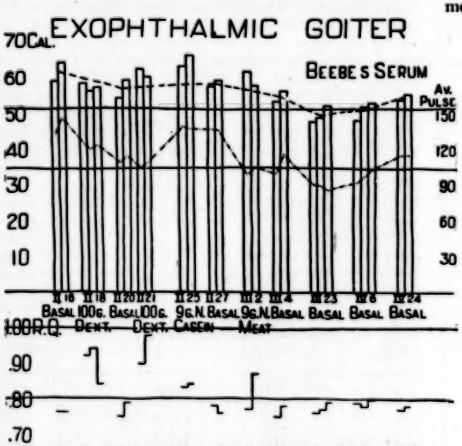


Chart 5.—Exophthalmic goiter. Results shown in hourly periods. Dash line connects basal determinations. Dot-dash line represents average pulse during the period of observation in calorimeter.

of this patient, since his metabolism was not raised even so much as that of a normal man by glucose, casein and meat. After treatment by Dr. S. P. Beebe with his antithyroid serum, there was a distinct improvement in the man's condition and fall in the metabolism. After the first month there was a rise in metabolism to its former level but the general improvement continued perhaps, however, at a slower rate.

A young woman who was up and about, though not quite able to continue her work as trained nurse, showed the extraordinarily high metabolism of 92 per cent. above the normal. After ligation of the arteries by Dr. John Rogers, the metabolism fell to 60 per cent. above the normal and the patient's condition was distinctly improved.

One young woman with a mild case of the disease showed a marked rise in metabolism four days after ligation of the four thyroid arteries, indicating that the operative procedure had temporarily increased the activity of the gland. Later there was distinct improvement in her general condition and a fall in the heat production to its former level.

Other conditions have been studied in a few cases and while the results need confirmation, they are suggestive and may lead to a better understanding of the various factors which influence the heat production in disease. One patient with splenic anemia, whose hemoglobin was 25 per cent., had a metabolism 11 per cent. above the normal; another with pernicious anemia for which a splenectomy had been performed, showed an increased metabolism amounting to 20 and 26 per cent. above the normal, while his hemoglobin was only 20 per cent. This confirms the older work, which demonstrated that there is no diminution of oxidation as a result of the low percentage of hemoglobin. In a patient with nephritis a change in blood-pressure from 195 to 160 caused absolutely no change in heat production. One man with acromegaly had a metabolism 18 per cent. above the normal, another with symptoms of deficiency of the secretion of the posterior lobe of the hypophysis gave results sometimes high and sometimes normal but he was so stupid that he made a very unsatisfactory subject. Another man with malaria was studied at the height of his fever, and also six days later when his attacks were cured. With a temperature of 104 F. the metabolism was 83 per cent. above the average, with a normal temperature 21 per cent. A patient with auricular fibrillation, mitral stenosis and greatly enlarged heart but without orthopnea, was observed three times lying flat on his back and twice propped up with a back-rest. We were astonished to find the metabolism which was normal when he was propped up was 8.5 per cent. higher when he was lying down and were even more surprised to observe the same phenomenon in the only normal control we studied in this posture.

The increases due to fever, hyperthyroidism and the like, are probably small compared to the increase caused by muscular work in delirium tremens or convulsions. Even slight restlessness or mild excitement causes a rise in heat production which is distinctly appreciable in the calorimeter.

In conclusion, it may be well to emphasize the fact that the nutrition of a patient depends absolutely on the relationship between his energy production and his food-supply. If the organism fails to obtain food from without it will draw on its own glycogen stores, fat depots and supplies of body protein.

129 East Seventy-Sixth Street.

10. Von Noorden: New Aspects of Diabetes, New York, E. B. Treat & Co., 1912, p. 20.

ABSTRACT OF DISCUSSION

ON PAPERS OF MENDEL, FOLIN, LUSK AND DU BOIS

DR. S. J. MELTZER, New York: For more than thirty years I have been moving on the periphery of laboratory work on one side and clinical medicine on the other side. Well do I remember the wide gulf which separated the laboratory men from the men in clinical medicine. To-day we have heard four men telling of their work in the sciences of medicine and telling it to a large audience, consisting, as far as I can judge, chiefly of men who are active in the practice of medicine. There are reasons for more congratulations. We heard to-day four men telling of their own original work in the scientific part of medicine. In the times gone by the laboratory man was satisfied to discuss work which was done on the other

side of the Atlantic; to-day the scientific men in Europe take profound notice of the work done in this country. Again, in the past, laboratory men used to be proud of the fact that they had nothing to do with the practice of medicine. To-day the laboratory men are anxious to do work in fields which are of special interest to the practitioner. Mendel speaks of "gaps and guesses" in scientific reports. I am certain that a thousand years from now "gaps and guesses" will have a prominent place in scientific reports. The gaps which we fill out by our investigations, we do by means of guesses, and they reveal to us new gaps. Liebig's theories are mere guesses for us to-day, to be forgotten. But they were instrumental in filling up many gaps by facts. Theories are of value because they help us to discover facts, and as long as they can do that they are still of value to us. I wish to say to Dr. Mendel that the amboceptor theory of Ehrlich, of which he spoke somewhat disparagingly, has brought out thousands of important facts in immunity, and is still capable of bringing out new facts. I am still more sorry that Dr. Mendel spoke in a somewhat disparaging manner about salvarsan. The synthetic creation of such a specific substance like salvarsan is one of the most wonderful discoveries made in recent times in the sciences and practice of medicine. The discovery by Dr. Mendel in conjunction with Osborne, that butter does contribute to the growth of rats, while lard does not do it, is perhaps the best he has ever made. This discovery was made by the empirical method; they do not tell us on what hypothesis they found it; neither what is the nature of the "vitamin" which differentiates lard from butter. We call this method, when used in science, the inductive method. But it differs from the empirical method which the physician uses merely by the application of criticism. Criticism is here necessary to differentiate the coincidental from the causal connection. Here the physician must learn from the scientist. A patient may get better merely while he is taking a drug and not because he takes it. But there is one point which the scientist has to learn from the physician; it is the principle of *non nocere;* be sure that you do not do any harm. For instance, the knowledge that the minimum diet is of no perceptible immediate harm to animals is no evidence that it will be of no harm, acute or chronic, to human beings. Neither do we know that infants will behave like rats regarding the difference between butter and lard.

DR. F. M. POTTENGER, Los Angeles, Cal: Does this difference in the absorption of fats apply to all animals alike, whether herbivorous or carnivorous and also to man?

DR. E. P. JOSLIN, Boston, Mass.: I should like to ask Dr. Lusk if he has an explanation to offer as to why the metabolism is not increased by food in typhoid fever?

DR. ALLAN EUSTIS, New Orleans: I wish to discuss that part of the paper in which Dr. Mendel refers to the amins formed by the putrefaction of the several amino-acids in the intestinal tract. This has a broad practical application in clinical medicine, as each of these amins has its own specific physiologic action, just as the amins from the vegetable kingdom, represented by the alkaloids strychnin, morphin, etc. Tyramin (para-oxyphenylethylamin), which is yielded by tyrosin on putrefaction, is capable of raising the blood-pressure in a dog from 110 to 250 mm., while in man it has produced a rise to 180 mm. I have made application of this fact in treating nearly five hundred cases of arterial hypertension, in which the systolic blood-pressure has been kept down to 140 or 150 mm. by dietetic means alone. It must be remembered that caseinogen of milk yields 7 per cent. of tyrosin on digestion which contra-indicates milk as an ideal food in this condition. Inasmuch as all animal proteins yield large amounts of tyrosin they are also contra-indicated, while the best results will be obtained from a cereal and fruit diet. The clinical application of the formation of histamin (beta-imidazolylethylamin) from histidin can be made in the treatment of bronchial asthma and urticaria. When injected intravenously, this amin causes violent bronchial spasm similar to an attack of asthma, while when rubbed vigorously into the skin a solution of 1:1,000 causes a typical urticarial lesion. Along dietetic lines alone, I have been able to give relief in 168 cases of bronchial asthma and twenty-six cases of urticaria, some of the asthmatics having had the disease for twenty years. A diet for these conditions should be based on the fact that the yield of histidin in the more common types of proteins is: hemoglobin, 10 per cent.; sturin, 12 per cent.; caseinogen, 2.5 per cent.; 2.5 per cent., and gliadin, 1.4 per cent. Articles of diet which yield little or no hisidin may be allowed. It must not be concluded that all cases of arterial hypertension are due to the absorption of tyramin from the intestinal canal, nor that all cases of asthma and urticaria are due to histamin absorption; but it must be admitted that these amins have a decided practical bearing in clinical medicine and must be reckoned with.

DR. DOUGLAS HEAD, Minneapolis: I should like to ask whether any observations have been made as to the effect of butter feeding on heat production in long, thin-chested, enteroptotic persons as compared with those of short, stocky build?

DR. A. J. CARLSON, Chicago: I think you all know that in this particular field America has made a distinct contribution to science. I have been impressed by the interest taken in this symposium by the members of the American Medical Association. If there is anything new of importance in the practice of medicine it is this modern work in nutrition. And it is evident that when the laboratory men really have something to say the clinical men will listen.

DR. VICTOR C. VAUGHAN, Ann Arbor, Mich.: Will Dr. Folin explain one point on which he did not touch? We recognize that in enterodigestion the proteins are split into amino acids. Dr. Folin holds that the amino acids are absorbed directly into the walls of the intestines, a view held by many others. The proteins are carried to each cell and each cell utilizes what is suited to its needs. This I dare say is all right. One point which he should explain, is important. There must be some synthesis of amino acids in the body. The sero-albumin and globulin in the blood are specific proteins, each coming from different sources. These are taken into the blood, and by the brilliant work of Folin and others we are now able to demonstrate the presence of amino acids in the body. Now there must be some synthesis somewhere. We must not lose sight of the fact that enterodigestion is not the only form of digestion that occurs in the animal body. There is in the blood a digestive process as much as in the intestines. A proteolytic ferment is present in the blood, a trypsin and an antitrypsin, and the understanding and the adjustment of the relation of these two factors is one of the great problems of physiologic chemistry.

DR. OTTO FOLIN, Boston, Mass.: Undoubtedly all will agree that the question asked by Dr. Vaughan is too much for even a laboratory worker to attempt to answer. The question that Dr. Vaughan has really asked is "How are tissues formed?" I have discussed the subject of the destruction and the history of protein in the body from the point of view of food and from that of destructive metabolism. The matter has two aspects, a destructive and a constructive; the constructive or the synthesis of protein is synonymous with the formation of tissue itself and is far from the transformation of amino acids into urea. There are two distinct aspects of metabolism. I considered only the destructive processes, the breaking down, and these only as produced by the class of agents sometimes known as enzymes. Frequently enzymes are of the destructive variety. They are hydrolytic and there is a degradation form of reaction. As to the difference between the enzymes and the proteins and the subject of hydrolytic and synthetic ones, all can discuss this part of the subject as well as I can.

DR. GRAHAM LUSK, New York: Replying to Dr. Joslin's question, "Why is there no increased metabolism in typhoid fever after giving an excess of food?" I would call attention to the fact that under normal conditions the basal metabolism is measured by the heat production of a subject whose gastro-intestinal tract is free from food and who is living at an environmental temperature of 26 C. (78.8 F.). If, however, the temperature be lowered there is an increase in the heat production although, under these circumstances, the ingestion of food may now produce no specific dynamic action. Furthermore, it is known that, if the metabolism be

increased to a certain point through carbohydrate, the addition of amino acids to the diet may cause no further increase in metabolism. Likewise, it should be remembered that in fever the protein metabolism can never be reduced to the low level present in the normal person, so that when amino-acids enter the organism under these circumstances they tend merely to replace those already breaking down in large quantity. It is therefore apparent why in fever the metabolism may have already been lifted to such a level that ingestion of food causes no further increase.

DR. EUGENE F. DU BOIS, New York: A comparison of the metabolism of enteroptotic persons with that of short, stocky men would be interesting, but we have had no opportunity of making such observations. From a theoretical consideration it would seem that the enteroptotic, undernourished persons would have a rather low metabolism, and it would seem that muscular persons would have the higher metabolism. Yet from clinical observations it appears that the enteroptotic persons have the greater energy requirement. We have at times tried to guess the actual heat production of individuals and groups of patients but have found that sometimes we were as much as 25 per cent. from the true figures as determined by the calorimeter.

COMMON ERRORS IN GALL-TRACT SURGERY *

C. E. RUTH, M.D.
DES MOINES, IOWA

An operative technic which gives a low mortality may be far from perfection, especially when relief is not obtained by the patient from the trouble for which the operation was done, or when other calamities must be endured by the patient which are a direct result of the operation.

In no class of operative procedures for non-malignant conditions are secondary operations required in so large a percentage as in those done on the gall-tracts. In no class of abdominal work is the temptation greater for inefficient or incomplete work, and in none is complete work more difficult than that encountered in many of these cases. Stones in the common duct, at or near the lower end, are found and removed successfully by only a very few operators. The amateur aspirant to surgical honors and perquisites can safely drain a large readily accessible gall-bladder, and if perchance he find a stone, that is the end of the matter with him as covering all requirements and obligations.

I am reminded that once I opened the abdomen, after having done several thousand abdominal sections, and examined carefully for gall-stones and did not find any, but at post-mortem four weeks later seventeen stones were found in the gall-bladder and one in the ampulla of Vater.

At another time when doing an abdominal section for other causes I confirmed by direct palpation a previously made diagnosis of gall-stones, but six months later when the patient came to operation for removal of the gall-stones, I could not even find a gall-bladder, but encountered pancreatic calculi amounting to over a thousand grains, forming a complete cast of the entire pancreatic duct system. These I was able, with great difficulty, to remove successfully through incisions in the pancreas after opening through the gastro-hepatic fold of mesentery, which enabled me to reach the affected organ after displacing the stomach downward. I am convinced that no operation for relief of supposed pathology in the biliary tracts is completed without an examination of the pancreas.

The large number of secondary gall-tract operations is due to errors in diagnosis, failure to remove all calculi, allowing the drainage to close while infection is still active, and failure to remove the gall-bladder in all cases in which there is not a free communication or

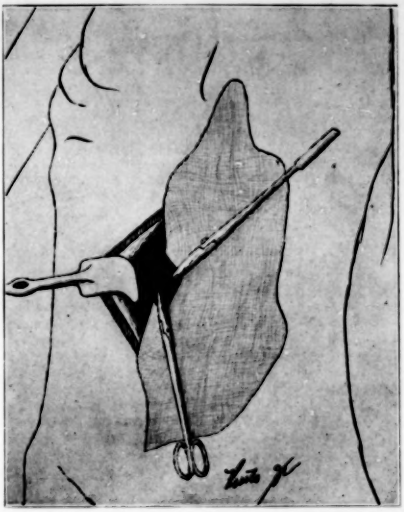


Fig. 1.—Author's technic. Method of incising gall-bladder, the fundus being grasped by flat forceps.

passage in both directions through the cystic duct, provided the common duct is freely patent.

Bile may often pass quite readily from the common duct into the gall-bladder, but returns with much difficulty or not at all by the ordinary contractions of the gall-bladder. In such cases permanent drainage or removal of the gall-bladder can alone afford permanent relief. The removal of the gall-bladder or its entire mucosa down close to the junction with the common duct is imperative to make relief permanent and obviate drainage annoyance.

In many cases of secondary operations following gall-bladder drainage I find the pyloric end of the stomach, first part of the duodenum, gall-bladder, liver and abdominal wall one continuous mass of adhesions. The result is that such a patient is never free from discomfort by pain, dragging, impaired stomach motility and often partial obstruction of the pylorus, which causes gastric dilatation with its accompanying entertainment. Unnecessary and rough handling of abdominal viscera during operation, unnecessary wiping of endothelial surfaces with gauze (especially dry gauze), extensive and unnecessary spreading of infection over clean territory and making no intelligent use of Nature's preventive material at hand are the principal causes of these deplorable and preventable com-

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plications. Relief of these patients from the operative complications requires much more skill and represents much more danger and difficulty than to deal properly with the original trouble.

In no case should the gall-bladder be attached directly to the abdominal parietes in drainage operations, because of the traction and dragging so liable subsequently to torture the patient. In all cases the drainage tube placed in the gall-bladder should be large and the margins of the gall-bladder should be inverted so that when the tube is removed the margins of the inverted gall-bladder opening at once collapse and promptly close the drainage (Figs. 3 and 4). However, should the bile show the presence of infection (by culture examination) a tube must at once be replaced and drainage maintained until the infection is under control.

The first or original tube placed in the gall-bladder must be secured by a catgut suture placed in the gall-bladder which will hold at least eight days (Fig. 4). The tube should lie free in the abdomen from where it leaves the gall-bladder to the point where it is to pass through the parietes, and at the latter point it should pass through a stab wound made on purpose for it, and should *never pass* (as is the almost universal custom) *through the main wound* (Fig. 5). The protruding end of the tube should then be connected to a drainage tube long enough to reach a safe distance from the patient (better attach it to the bed rail), where it enters a bottle containing 2 or 3 ounces of 10 per cent. alcohol-carbolic solution, into which the end of the drainage tube is passed so that the end of the tube is kept all the time below the surface of the liquid. This plan enables the main wound to be closed entirely and to remain dry, and in the vast majority of cases primary union can be secured, thus entirely eliminating other preventable complications, namely, suppuration of any part of the main wound, prolonged convalescence and a large percentage of hernias, for which there is *slight, if any, justification* (Fig. 6).

The use of the median incision for operating in all gall-tract cases will make it possible at the same time to deal with any other condition or complication in the abdomen through the same, or an extension of the same, incision, while it almost removes the temptation to use the main wound for drainage instead of the stab, say 2 inches to the right, which will give vastly better drainage, particularly with the patient lying on the right side. The time-honored incision through the rectus, straight or bayonet, is much more vascular than the median or near median incision, causing some degree of annoyance in operating, and when anything but a simple drainage of a readily accessible, distended gall-bladder is done, requires enlarging to such a degree that more or less sectioning must be done of the nerve supply to the abdominal wall and rectus with permanent sensory paralysis of a portion so that as one patient expressed it, "I am unable to tell whether I am feeling my own abdomen or some one else's except by sight," to say nothing of increased danger to hernia from imperfect motor and nutritive muscular innervation as well as liability to infection from drainage contact with the line of incision. Many gall-tract cases require appendenctomy, and in women often attention to the uterus or adnexa as well, in which case the median incision or an extension of it enables all to be done through the one incision with no necessity for any complication whatever arising from such extension and with no added operative difficulty. Any gall-tract operation can be done quite as well, and if complicated much better, through the median incision.

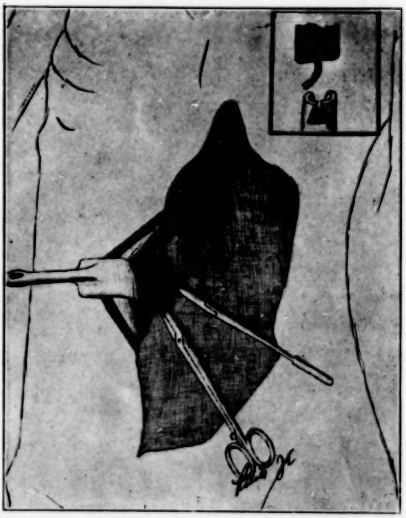

Fig. 2.—Opening in fundus spread, allowing ready access to the interior of the gall-bladder. Method of placing the first row of sutures, and the prepared drainage tube are depicted in the upper corner of the illustration.

Fig. 3.—Drainage tube *in situ*, and held by the first row of sutures.

Removal of the gall-bladder is seldom difficult if done at the first operation under proper technic or as a secondary procedure, provided infection and trauma have not caused extensive and dense adhesions.

In my own work I prefer to remove the gall-bladder by first clamping the cystic duct between strong forceps close to its junction with the common duct, and then divide the duct between the forceps. The forceps placed on the cystic duct close to the common duct must be made to grasp the cystic artery also. The gall-bladder is then readily separated from the under surface of the liver and entirely removed almost without hemorrhage. In other cases in which adhesions are dense and it is difficult to find and follow the cystic duct, though the gall-bladder is accessible, I have found it easier and better to follow the gall-bladder and cystic duct downward from the fundus, splitting the bladder and duct all the way down. In this way I have found it easy to trace and the hemorrhage was slight. When the termination of the duct is found, it and the gall-bladder may be dealt with as above, or the mucosa of the cystic duct may be ligated close to the mouth of the duct, all the balance of the mucosa removed and the two outer coats closed over all, leaving a smooth peritoneal surface. This is as effective as removal and it as safely eliminates the gall-bladder as a subsequent annoyance as does the other plan.

A good-sized drainage tube should, however, be sutured in the bottom of the wound in contact with the point of greatest probability of bile leakage, and the patient should lie on the right side for the first forty-eight hours so that there will be free down-hill drainage through the tube to the outside of the body and no tendency to damming back or overflow through the general peritoneal cavity, but an open canal and no back pressure.

An additional precaution is the placing of an angular or curved glass tubal connection in the drainage tube which passes through the abdominal wall and connecting the other end with a long tube which is passed into the drainage bottle; and by leaving 1 or 2 inches of the glass connection exposed, the presence or absence of drainage can be at once noted on inspection.

In obstruction of the common duct from inoperable carcinomatous conditions, it is wise to make an anastomosis between the fundus of the gall-bladder and the highest point available in the small intestine.

A small Murphy button properly placed makes an admirable anastomosis connection, though I think it wise to attach a string and piece of gauze to the intestinal side to exert traction on the button and prevent its sticking or perchance falling back into the gall-bladder.

When the gall-bladder is not available as above for switching the biliary current into the intestinal tract, and the common duct is largely lost by removal for malignancy, a soft rubber drainage tube may be inserted into the hepatic end of the common duct and secured by encircling catgut ligature and suture while the other end is inserted into the duodenum passing through the intestinal coats diagonally for ½ to ¾ inch. It should have a silk or linen thread attached to gauze in the intestine and fastened to the lower end of the tube. This will make light traction on the tube in all downward peristalsis, and will finally free the rubber, which will pass with the fecal current, but not before Nature's kindly offices have formed a mucous- and endothelial-lined tube or new duct to convey bile into the intestine.

The function of the gall-bladder being to regulate the tension of the gall circulation and not at all for storage purposes readily accounts for the relative

SUMMARY OF OPERATIONS ON THE GALL-TRACT

Case	Age	Stones*	Operation	Complications	Infection	Remarks
1	71	+	Primary	Infarcts in liver profoundly septic	Not determined	Condition critical; pus; extensive adhesions; patient died†
2	39	+	Secondary	Gastrojejunostomy	Colon bacillus	Extensive adhesions
3	60	+	Primary	Profoundly septic	Not determined	Condition critical; pus
4	36	—	Secondary	.....	Mixed, colon bacillus, staphylococcus	Extensive adhesions‡
5	51	+	Primary	Phthisis very adv.	Colon bacillus	Condition critical
6	34	+	Primary	Appendectomy	Colon bacillus	.....
7	42	+	Primary	Appendectomy, trachylorrhaphy, perineorrhaphy and hemorrhoidectomy.	Mixed, colon bacillus, staphylococcus	Pus
8	34	—	Primary	Appendectomy and right oophorectomy	Colon bacillus	.....
9	35	—	Primary	Appendectomy and ten days later pneumonia	Pure streptococcus	Condition critical
10	39	+	Primary	.....	Colon bacillus	Pus
11	50	—	Secondary P. O.	Ventral hernia and extensive adhesions	Not determined	Extensive adhesions§
12	48	+	Primary	Umbilical hernia and later perineorrhaphy and hemorrhoids	Colon bacillus	.....
13	36	+	Primary	.....	Colon bacillus	.....
14	64	+	Primary	Umbilical hernia	Colon bacillus	.....
15	53	—	Primary	Visceroptosis	Colon bacillus	.....
16	45	—	Primary	Appendectomy	Not determined	.....
17	45	+	Primary	Appendectomy	Staphylococcus	.....
18	53	—	Primary	Appendectomy, later phlebitis, septic	Mixed, colon bacillus, staphylococcus, streptococcus	Condition critical; extensive adhesions
19	54	+	Primary; secondary P. O.	Ventral hernia and ovariotomy	Colon bacillus	Condition critical; extensive adhesions‖
20	55	—	Primary; secondary P. O.	Hemorrhoidectomy	Not determined	.....
21	53	+	Primary	Appendectomy	Colon bacillus slow in clearing up	.....
22	27	—	Primary	Appendectomy	Pure staphylococcus	.....
23	33	+	Primary	Typhoid fever	Pure typhoid	Condition critical; pus

* In this column + indicates stones, and — no stones. † This was the only death in this series; the other patients recovered. ‡ Mrs. H. L. had one previous cholecystotomy operation for the same condition and required two subsequent operations before recovery was complete and permanent. The last consisted of cholecystectomy. § Mrs. L. E. S. had three previous abdominal sections which were accountable for the ventral hernia. Those three previous operations had been done by the same operator. Conditions unknown to the writer.
‖ The ventral herniotomy complication in this case (Mrs. M. C.) resulted from an abdominal section done by the writer two years previously when an ovariotomy was done for removal of a cyst containing 3 gallons of pus, and her temperature was 103 under profound sepsis.

impunity with which it may be removed and the patient suffer no marked inconvenience in its loss.

Avoidance of a return to the old habits of life which caused the original gall-tract infection will usually prevent a return of the conditions which necessitated the first operation, provided the operation be properly done or the patient's condition be such as to warrant a completed operation.

The time has long and forever gone when we operate on the gall-tract simply to remove stones. Recently I drained a gall-bladder for an infection

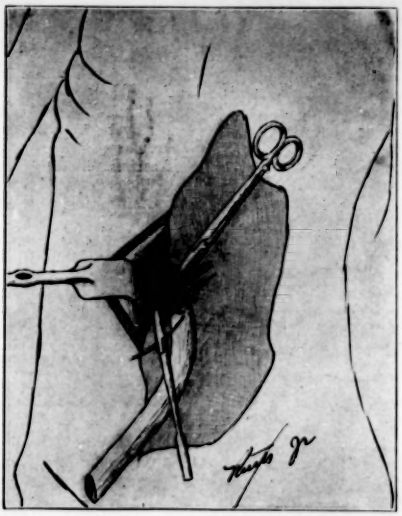

Fig. 4.—Second row of sutures in place and tube ready for inversion into the gall-bladder. Note the suture passing through the tube, insuring against dislodgment by undue traction or other accident. (The suture ends have not been tied and clipped.)

which was only four days old and found that we were dealing with a most intensely vicious, primary, pure streptococcic infection. The progress of this case, however, was favorable until the tenth day when a pneumococcic infection caused complete consolidation of the entire right lung. The latter complication taxed the patient to the utmost and made it impossible to avoid infection of the main wound, which is a rare occurrence in our work, though a good recovery was made.

Three cases are of sufficient interest, I think, to justify reporting in some detail:

CASE A.—Mrs. L., patient of Dr. Johnson, Alden, Iowa, was operated on about six weeks before she came into my hands, and drainage of the gall-bladder was done, but no stones were found. She was first seen by me Nov. 8, 1912, and operated on in Iowa Falls. She had obtained no relief from the previous operation.

Finding the pyloric end of the stomach and the first part of the duodenum firmly attached to the anterior abdominal wall, I released them and redrained the gall-bladder. Relief was prompt and continued so long as the drainage was maintained, but pain returned at once when the drainage of bile ceased.

She returned to me for operation, Feb. 3, 1913, at which time, dreading to remove the omental graft which I had placed to prevent the duodenum and stomach from uniting to the abdominal wall, and not enjoying the prospect of an enucleation of the gall-bladder because of the adhesions which I knew to be extensive and dense, I decided to drain permanently the gall-bladder into the nearest and most readily accessible part of the intestinal tract; this happened to be the hepatic flexure of the colon.

The anastomosis was made with a small Murphy button with string and gauze in the intestine attached to the bottom. Recovery was without incident save that the button was never found, and she was absolutely free from pain and discomfort for five months, when the pain returned as before.

Examination showed that the cholecystenterostomy anastomosis had practically closed so that drainage of bile into the colon from the gall-bladder was no longer free, and the gall-bladder was found distended with bile which had become sufficiently stagnant within the cystic duct to begin the formation of calculi on a mucous cholesterin precipitate. The gall-bladder was accordingly removed after sectioning and permanently and carefully closing the former attachment to the colon. This plan offered the only apparent hope of permanent relief because the cystic duct patency permitted of tolerably free passage of bile into the gall-bladder but would not allow it to return readily by the same route.

CASE B.—Woman, referred by Dr. Will G. Walker, Corydon, Iowa, was operated on in April, 1910, and had two gall-

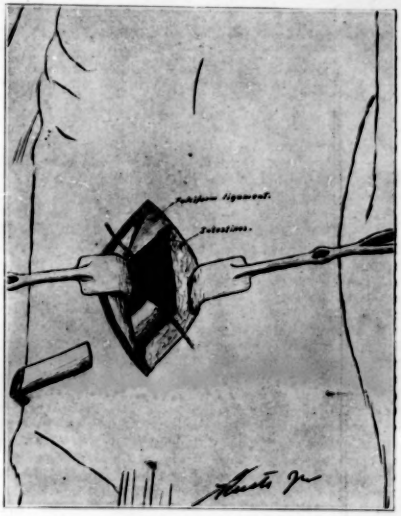

Fig. 5.—Showing position of parts after the tube has been inverted and the free end brought externally through a stab wound. Generally a stitch of silk-worm gut is placed through the skin edges and tube, again insuring against dislodgment of the tube by traction.

stones removed and some work done on the pelvic organs. March, 1911, she was operated on and another drainage of the gall-bladder was done. Neither operation gave any relief from pain or daily vomiting. She was first operated on by me Dec. 13, 1911, for a small inguinal hernia on the right side. Following this herniotomy she did not vomit for five weeks. Then vomiting returned and was as bad as before.

June 24, 1912, she returned for relief from pain and vomiting. Roentgenoscopy revealed dilatation and ptosis of the

greater curvature of the stomach. Impaired motility of the stomach was believed to be due to adhesions. Opening the abdomen disclosed a mass of adhesions so dense and extensive that in the patient's enfeebled condition I lacked the courage to separate them and chose the easier operation, namely, a posterior gastrojejunostomy without loop, in the hope that better drainage of the stomach would control the pain and vomiting. Recovery was prompt and she rapidly gained in flesh and strength, but within a few weeks occasional vomiting and some pain returned, and within five months it was as bad as ever, though on a dry diet she would occasionally gain quite a little for a time in flesh and strength only to lose it again.

Fig. 6.—Showing arrangement of external drainage system. Skin about median wound remains slightly discolored from iodin stain. Note relation of stab wound to median incision, and the glass connection (sight drain) between drain proper and rubber tubing. Bottle, containing alcohol-phenol solution, should be lower than depicted, thus obviating all danger of kinking the tube at the neck of bottle.

May, 1913, careful examination of stomach after Ewald and motor meals showed only evidence of impaired motility, presumably due to the old adhesions following her first two operations.

July 16, 1913, I separated the most extensive and dense adhesions I have ever seen that were uniting stomach, duodenum, liver and anterior abdominal walls, and then over all the extensive area thus denuded I anchored omentum to prevent reformation of adhesions and limitations of the stomach and duodenal functions. Slight acute dilatation threatened for a couple of days, but yielded to the use of the stomach tube, after which recovery was uneventful and the patient gained about 30 pounds in weight in three or four months, but within eight months there was a return of the old symptoms and loss of all she had gained.

CASE C.—Mrs. G., referred by Dr. J. W. Garver, Peru, Iowa, was operated on in January, 1910, for cholelithiasis; in April, 1910, ovariotomy was done; in January, 1911, she was operated on for ventral hernia, and in September, 1911, for appendicitis. She came into my hands July 25, 1912, suffering from severe attacks of pain and vomiting. Pain was vaguely located in her upper abdomen. Her strength, however, was good and she was quite obese. She had dilatation of the stomach, and nearly all the omentum she possessed had been used up in adhesions resulting from previous operations. We had decided on gastrojejunostomy as the safest and surest means of relief, but finding a gall-stone of considerable size, it was removed and drainage of the gall-bladder was done, after which I did my regular posterior gastrojejunostomy without loop, *with rubber dam over the posterior edge of the anastomosis.* She has for nearly two years since operation been free from pain and vomiting, and has made considerable additions to her already abundant adipose.

These cases are presented as object lessons, in the belief that an analysis of the cases in which bad results were obtained or in which the patients were relieved only after four or five operations may help us in reaching the goal at a bound, or at most a second trial, in competent hands instead of repeatedly jeopardizing life in new operative attempts in which the surgeon's operative difficulties have been doubled or even quadrupled by previous bungling.

It is to be hoped that a better understanding of the value and use of the omentum may soon become more general among those who essay the art of surgery, that the stomach and intestines particularly may be less impaired in their subsequent functions after all abdominal work, but especially in the upper abdomen. All friction of a delicate endothelial surface in the abdomen by gauze of any kind must be avoided or reduced to the minimum. Especially must no dry gauze be allowed to *ever come in contact with any endothelial surface* in the abdomen unless it be for the deliberate purpose of destroying or injuring the same and causing adhesions as may be justifiable in attempts to secure *omental* vascular attachments to the abdominal walls in cases of ascites. The slightest contact of dry gauze with any of the endothelial lining of the abdominal cavity will destroy much of its surface.

Carelessness in failure to protect the intestines and omentum from skin contact, now that the use of iodin in skin preparation has become almost universal, is another cause of adhesion complication in otherwise clean and satisfactory operative procedures. It is not an uncommon sight in the operating room to see large masses of abdominal viscera rolled out of the abdomen on a skin surface, but recently painted with Churchill's tincture of iodin.

COMMENT ON OPERATIONS IN TWENTY-THREE CASES

The twenty-three cases in which operation was performed in the few months covered by the report present an average age of 46⅙ years, the oldest patient being 71 and the youngest 27 years of age.

Fig. 7.—Same as Figure 6 (Case 21), showing abdomen after removal of drainage tube.

Seven of the cases are noted as in a critical condition, by which I mean that they were emergency cases as truly as the average acute appendicitis.

One patient, however, was in the last stages of pulmonary tuberculosis and was operated on because of the terrible suffering from the cholelithiasis from which she begged operative relief. She recovered without incident from the operation, but died from tuberculosis soon after her return home. The operation gave her immediate and complete relief from pain.

There was only one fatality, and that in a man aged 71, who had had biliary obstruction for four months, was *in extremis* with profound sepsis and numerous infarcts in the liver, and the gall-bladder showed necrotic points.

Ether was the anesthetic used in all but the tuberculosis case, in which chloroform was given.

The operation time ranged from thirty minutes to one and three-quarter hours, according to the severity, difficulty and number of complications handled.

Gall-stones were found and removed in fourteen cases, no stones in nine. In Case 9, however, while

Fig. 8.—Showing applicability of method in case of general suppurative peritonitis complicated by acute dilatation of stomach, with enormous amount of fecal matter in the organ. Patient apparently moribund four days before abdominal section. Although median wound was bathed in purulent matter, union of the parts was obtained without any difficulty.

we found no calculi we did find a pure streptococcus infection, and he had a leukocytosis of 62,200, with 90 per cent. of polymorphonuclears. Fifteen cases showed colon bacillus as the infecting organism, three of which had joined company with the staphylococcus, and in one case both streptococci and staphylococci were present.

Other operations and diseases are noted as complications and were present in twenty of the twenty-three cases.

Of these complications nine are appendectomies, two ventral herniotomies, two umbilical herniotomies, two perineorrhaphies, two ovariotomies for ovarian cysts, one trachylorrhaphy, three hemorrhoidectomies and one phlebitis. Three patients had profound sepsis, and in one of these gravely septic cases the gall-bladder mucosa, being necrotic, was removed. In only one case was a cholecystectomy done, and in one the mucosa of the gall-bladder was removed. All cases were drained until the discharge was nearly or quite sterile. In all but three cases the gall-bladder was inverted around the drain and all closed within one week after the drainage tubes were removed, and some did not drain longer than two days after removal of the tube.

One case was complicated by visceroptosis and in that case the ptosed condition received operative attention.

One case developed consolidation of the entire right lung on the tenth day (pneumococcic infection), and in this case the infecting organism in the gall-bladder was a pure primary streptococcus.

In the series of twenty-three cases cholecystotomy was complicated by no less than twenty-nine operative or other conditions of greater or less importance.

If this small number of cases can be said to carry any important lessons for us it would seem to be that cholecystotomy without grave complications should be practically without mortality.

Cholecystotomy is no bar to other operative procedures if the patient is in good condition and the operations be properly done with sufficient dispatch, and whenever possible other important pathologic conditions should be eliminated as far as it is consistent with safety to the patient.

ABSTRACT OF DISCUSSION

DR. FREDERICK COTTON, Boston: We all see a lot of cases in which a secondary operation in gall-bladder surgery is necessary, and we all know the difficulty of preventing adhesions. Dr. Ruth spoke particularly of the median incision, which is not the usual incision made. I think we all agree that the old incisions are unnecessary; but as between the more usual incision at the side of the rectus abdominis and the median incision, there are certain grounds for debate. I have used the median incision for a good while in explora tions and used the rectus incision for gall-bladder drainage. The danger of hernia is not common unless a duodenal leak occurs. I have seen only one case after digestion of the abdominal wall for weeks from escaping pancreatic juice. Hernia is not a particularly important factor in these upper abdominal cases if good closure is obtained.

DR. EDWARD MARTIN, Philadelphia: Concerning but one or two points in Dr. Ruth's paper there may be a difference of opinion. Surgeons who operate on the liver and ducts may be compared to plumbers. A first-class plumber always leaves something to go back for. With the surgeon this something is not intentional but is incidental to an incomplete preparation and operative diagnosis. In a number of operations for gall-stones they have not been found, or, indeed, anything else which could be bettered by surgical intervention. Under such circumstances if there be no evidence of back pressure, if the gall-bladder is normal and has not been treated brutally, what particular reason is there for drainage? The gall-bladder is easily, quickly and permanently closed, and the wound convalescence is as prompt as is that from any simple incision. Dr. Ruth advocates a median incision. In certain patients with lax abdominal walls the median incision will reach any point; but why we have adhesions, why we fail to find gall-stones, or to diagnose pancreatic conditions, is because we do not provide adequate access, without visceral and parietal trauma. The vertical cut if made in women with fat, full, tense abdomens gives poor access. If made to the inner side of the middle of the rectus muscle it divides no nerve trunks. If made to the outer side it divides the nerve-supply and is followed by atrophy of the rectus segment. Hernia develops and may become a distressing complication. Moreover, a satisfactory closure of the deeper part of the parietal wound is often difficult or impossible. The incision which gives best access, is least destructive and is most readily closed is first a vertical midline cut for primary exploration; then a transverse cutting of the rectus muscle five fingers' breadth above the umbilicus, a splitting of the external oblique, cutting of the internal oblique and a splitting of the transversalis upward and outward toward the costal border. The whole flap is turned up, when the liver and its ducts are entirely accessible for exploration or operation. Under this incision I have exposed and satisfactorily drained an abscess at the very top of the liver not bigger than a small apple. How many operators have been satisfied with closure of a vertical cut in one of the fat, full abdomens, the stitches tearing through the posterior rectal sheath on the slightest tension? The view of such a wound from within the abdomen gives a picture widely differing from that suggested by the final neat skin closure. With the vertical and transverse cut, the stitches hold because the direction of their pull is across that of the

muscles and fascia, the wound comes together easily and the ultimate closure is good. Two fingers' breadth above the umbilicus is the usual position of the transverse tendinous lines of the rectus muscle. The suture is somewhat easier if the cut be carried through the line. This is, however, not necessary as mattress sutures readily approximate and hold in place the cut muscle surfaces.

DR. PHILANDER HARRIS, Paterson, N. J.: In operating on the gall-bladder for gall-stones I have employed one or other of the vertical or downward incisions. I have operated a few times by the central incision but not sufficiently often to become familiar with it. If I should adopt the central incision I question whether I could so easily deliver a portion of the liver as I can with the vertical incision. Whatever I might say against the central incision would be theoretic and not entitled to any consideration. I have employed nothing but stab-wound drainage in operating for gall-stones in more than eight years. I certainly feel that the best way to get undesirable secretion out of the body is to bring it through a stab-wound incision, getting as far to the right as has been indicated by Dr. Ruth. I do not drain through the incision, nor do I sew the gall-bladder to the peritoneum. The advantage, I believe, of stab-wound exit and efficient drainage established in that manner arises from the fact that it is on lower ground. Unless the patient is turned well to the right it is a decided advantage to have the drainage at the lower point of the incision and to the right of it. The operation might, perhaps, be improved by employing two large tubes instead of one. I have employed twin drainage with stab-wound exit for five years. With the double drainage two tubes come out of the stab-wound exit and from each of them there is a drainage pail. One tube may enter the gall-bladder; the other, any desired place. The gall-bladder is sewed with very fine catgut around the tube which enters it, and the catgut by which the fundus of the bladder adheres to this tube is carried out through the stab-wound by means of the forceps. In the first twenty-four hours blood comes out through the little triangular space. In two or three days the wick is withdrawn and the tubes may be left as long as desired. I believe that the operation of cholecystectomy is gaining ground while the operation of cholecystotomy is taking a less important place.

DR. D. N. EISENDRATH, Chicago: We are passing through the same stage with regard to common-duct surgery that we have passed through with the gall-bladder proper. There was a time when one could only make a diagnosis of gall-stones when the patient had jaundice. That we cannot have common-duct stone without jaundice is a belief that had better be dropped. I find that the secondary cases have been those in which the gall-bladder has been taken out and in which the operator did not have the courage to take out the common duct. It is time for us to decide that when we operate for gall-bladder disease we have to consider also the condition of the common, hepatic and cystic ducts. If I find gall-stones in the gall-bladder it is the last part of my operation. As Dr. Martin said, we cannot get as good exposure of the common duct through the median as through the lateral incision. Kehr, a year ago, reported 54 cases in which he had examined the common duct and in 32 palpation was negative and yet stones were found. In over 50 per cent. of my cases when palpation was negative, by opening the common duct I have found stones. My technic is to leave the gall-bladder alone at the early part of the operation, take a couple of traction sutures and open the common duct between them, explore toward the ampulla and up into the hepatic duct. A considerable number of the so-called secondary operations are due to overlooking common-duct stones. Another element of failure is leaving a gall-bladder in, which ought to have been taken out at the first operation. Taking the gall-bladder out in the secondary operation is most difficult. Everything is so adherent that you cannot get a line of cleavage. This can be avoided if the gall-bladder is taken out primarily. When the common duct is enlarged to the size of the index finger, or its walls are thickened or there are many small stones in the gall-bladder the common duct must be explored. If there is marked pancreatitis, drainage of the common duct is also of much benefit. It has been shown experimentally that at the end of three weeks the bladder, no matter how badly infected, is sterile.

DR. J. H. CARSTENS, Detroit: It seems that all these cases depend on circumstances. We can remove the gall-stones, sew up the gall-bladder and drop it back. If there is an infected gall-bladder this cannot be done. It can be done only with the mulberry variety of gall-stones; this I often do. In clean cases I make the incision transversely in the direction of the fibers of the external oblique muscle, separating them and pulling them apart. Then I separate the fibers of the rectus in the opposite direction without cutting them and pull them apart. I separate the transversalis fibers and take hold of the gall-bladder, opening it and remove the stone or stones, and carefully close it, bringing the edges together and amplifying it with a row of Lembert sutures. I then drop the gall-bladder and close the opening in three layers. The incision is always very small. I thus have not cut any nerves and there is no danger of hernia. I make the same incision in ordinary cases, when I want to drain but do not attach the gall-bladder to the incision. In some cases there are extensive adhesions but they have produced no symptoms. I generally can feel the ducts, and if I find no trouble I let the adhesions alone, because if they are broken they may produce new adhesions that will cause serious symptoms. I separate only enough adhesions to get to the top of the gall-bladder, which I open, scoop and float out the gall-stones, and insert a drainage-tube. If I have an infected gall-bladder I do not operate until the acute inflammation has subsided, if possible. Then I make as small an incision as possible, pull up the gall-bladder and stitch it all around to the peritoneum without opening it. I have thus the peritoneum clean and closed and can open the gall-bladder and wash out the gall-stones without danger of infection. Sometimes I also take out the gall-bladder if it is gangrenous, or remove only the lining membrane. As a rule, before I touch the gall-bladder I explore the ducts. If they are pervious and contain no stones I let them alone; if they are large I split them up, but I would not split up every one when there is nothing the matter with it. In some of these cases we also have a loose liver coming down and causing great distress. In such cases I generally scrape the surface of the liver and the anterior peritoneum behind the ribs, shove the liver into place as nearly as possible and then stitch the gall-bladder to the incision, which I make quite high, and it helps materially, I think, to keep the liver in place, although the latter may become sufficiently adherent to relieve the symptoms without the attachment of the gall-bladder.

DR. JOHN A. MCGLINN, Philadelphia: I take the rather advanced stand that gall-stone disease is essentially a surgical and not a medical condition and if diagnosed the stones should be removed. I do not believe that gall-stones may be innocuous for a number of years and no pathology result from their presence or the original cause of the stones. Four years ago I studied and reported observations on the pathologic findings in 506 cases of gall-stones. In all of these cases gross pathologic lesions were found either in the biliary tract or adjacent organs. It is interesting to note that the lesions were practically always multiple. This explains why it is so often necessary to reoperate in gall-stone cases. The tendency is simply to remove the stones when found and not seek for other pathologic lesions. It should be borne in mind that the whole right upper quadrant of the abdomen should be explored in operating for gall-stone disease, so that lesions of various parts of the biliary tract as well as those of adjacent organs can be dealt with.

DR. F. D. GRAY, Jersey City, N. J.: The question of double drainage mentioned by Dr. Harris should, to my mind, only arise under exceptional circumstances. It might be considered when the field of operation has been soiled or when there is uncontrollable oozing of blood. Again there may be a doubt in one's mind whether the sutures will hold in unusually softened tissues with a resultant leakage. If

there is any necessity for drainage, except that of the gall-bladder, it appears to me that a drainage tube will, in that location not be sufficient, on account of the tendency of septic fluids to gravitate into the lower abdomen. The most effective thing under these circumstances is to introduce a strip or two of iodoform gauze beneath the gall-bladder (or its stump in cases of cholecystectomy), below which is inserted a layer of dental dam, to prevent adhesions, the whole of which constitutes a coffer dam, as it were, to intercept and carry all drainage fluids to the surface. In my opinion this is more effective than a second tube can be and I have had good results with the method.

DR. CHANNING W. BARRETT, Chicago: The necessity for the median incision can be done away with by a double incision instead of a compromise one to reach two extreme ends of the abdomen. The compromise incision never reaches either end very well. If the gall-bladder is to be operated on, a 3-inch incision will attend to that. This can be made without injury to the abdominal wall and nerves.

DR. C. E. RUTH, Des Moines, Iowa: I use the stab-wound drainage because properly used it will never produce hernia. No drainage, however, can be continued through any wound without some infection about it, and for that reason there is a liability that if we use the main wound for drainage we will add to or cause infection that could be avoided. So far as hernia is concerned, possibly it is not common in the East, but it has been with me a source of great trouble, not in my own cases, however. The secondary cases coming to me with hernia are not a few. In determining the time of drainage we have, in practically all our cases for the last year and a half, made repeated cultures before we allowed closure of the wound. We never allowed the wound to close until the primary infection had become decidedly diminished in virulence. The staphylococcus from the skin we try to avoid by taking our cultures far down in the gall-bladder. With reference to stones being the cause, as mentioned by Dr. Martin, for this operation, I believe they are the primary cause of infection. I never object to the straight median incision and I increase the size if necessary to get the space for rolling the liver out. I do object particularly to the old longitudinal incision that starts under the rectus and which, if prolonged, does cause destruction of the nerve-supply to a portion of the abdomen. If one prefers to use two incisions I have no objection, but I prefer one. I have never found it necessary to use more than one, or to curve the incision to the right. I can conceive of the possibility for it, but so far have not found it necessary. There is no question that the use of two tubes when the peritoneum is soiled, is good practice. I have abandoned stitching the gall-bladder to the peritoneum because of the traction. I like the use of the round ligament for the suspension of the gall-bladder.

TREFOIL OR STELLATE KERATECTOMY FOR ANTERIOR STAPHYLOMA *

S. LEWIS ZIEGLER, M.D.
PHILADELPHIA

Keratoplasty has been successfully employed to remedy certain corneal defects, but only a moiety of procedures have been devised to meet the indications present in anterior staphyloma. When a protruding but circumscribed corneal ectasia has proved to be more or less obstructive to the vision, and the remaining tissues of the globe have not been seriously involved in the pathologic process, conservative surgery demands that a mobile globe shall be preserved, and, whenever it is possible, that a modicum of useful vision shall be secured.

* Read before the Section on Ophthalmology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

To meet these indications I devised, in 1895, a simple form of corneal excision, which I have designated as *trefoil keratectomy*. It is adapted chiefly to those cases in which a limited portion of the cornea is staphylomatous and in which correction of the ectasia can be made by the removal of a three-leaved flap from the lower part of the pendulous cornea (Fig. 1). When, however, the whole cornea is involved and a four-leaved flap must be excised to correct the deformity, the procedure is designated as ***stellate keratectomy***.

PRELIMINARY TREATMENT

Full antiseptic precautions should be observed, as most cases of corneal staphyloma are the result of infectious processes, such as trachoma, suppurative conjunctivitis and other mucopurulent discharges. A course of sedative treatment should, therefore, be applied to the palpebral conjunctiva. As many of these cases are complicated by lacrimal blennorrhea or obstruction, it is often necessary to perform rapid dilatation of the tear-duct. If this is indicated, it should be done at least one week prior to the corneal excision. It is often wise to irrigate the nose with an antiseptic wash.

ANESTHESIA

This operation has been performed under cocain-epinephrin anesthesia, but full ether narcosis is to be preferred, since the restlessness of the patient might interfere with the proper introduction of the sutures, or even cause an injury to a transparent lens, if such should be present.

Fig. 1. — Vertical section of anterior staphyloma, showing clear cornea above and ectasia below. The thickened iris-tissue has been glued to the cornea by plastic inflammation.

INSTRUMENTS REQUIRED

In my earlier operations I used a speculum, Graefe knife, fixation forceps, a pair of small, strong scissors, a needle-holder, needles and fine black silk sutures. In cases of emergency an iris forceps, iris scissors, silver spoon and spatula, and a wire loop may be required and should be included on the tray. In a later method I changed the technic by substituting a keratome for the Graefe knife, and a corneal punch (Fig. 2) instead of the scissors. The two methods appear to be equally efficient, although in certain cases the punch cannot be used because of lack of space in which to introduce it.

DESCRIPTION OF OPERATION

Three methods will be described, (*a*) trefoil keratectomy with the scissors, (*b*) trefoil keratectomy with the punch and (*c*) stellate keratectomy with both scissors and punch.

Trefoil Keratectomy

Scissors Method.—First Stage: With the speculum inserted and the globe firmly held by fixation forceps, the operator should first inspect and outline the exact area to be excised (Fig. 3 *A*). The Graefe knife is then passed horizontally through the base of the staphyloma from the temporal to the nasal side, keeping the edge of the blade turned directly forward, as for a Saemisch incision, and drawing it backward and forward but not allowing it to emerge fully until the aqueous fluid has completely escaped (Fig. 3 *B*).

Second Stage: One blade of the scissors is now introduced beneath the upper margin of the horizontal incision, a little to the right of the center (2 or 3 mm.), and a long vertical incision made. A second converging cut is then made, the same distance to the left of the center, which joins the first at the apex and thus makes a V-shaped incision and opening (Fig. 3 *C*).

Third Stage: The two corners of the opposing wound-margins are successively grasped with the forceps and a triangular piece (Fig. 3 *C*, upper margins) excised by scissors from each corner, thus making a three-leaved opening (Fig. 3 *D*).

Fourth Stage: The vertical wound is closed by two or three fine black silk sutures passed through the opposing wound-margins and tied (Fig. 3 *E*). The horizontal wound is then sutured in like manner (Fig. 3 *F*).

A Kalt suture (linen) may, if preperred, be inserted through the outer layers of the cornea and tied as a mattress-suture. The cut surfaces must be carefully approximated at all points.

Punch Method.—First Stage: A vertical incision is made through the base of the staphyloma with an angular keratome (Fig. 3 *G*), and the inferior blade of the punch is passed into the anterior chamber and beneath the cornea, while the punch is closed with a

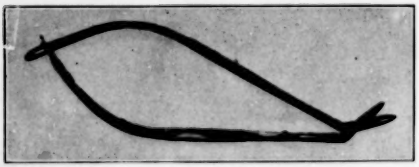

Fig. 2.—Corneal punch, with long oval points. The spring was adapted from McClure's iris scissors.

short, quick thrust, thus excising the left lateral flap (Fig. 3 *G*, shaded part).

Second Stage: The punch is removed, introduced on the other side of the wound-edge, and the right lateral flap is excised in the same way (Fig. 3 *H*, shaded part).

Third Stage: The upper margin of this long, oval wound is now grasped at its center by the punch and a vertical piece excised (Fig. 3 *I*, shaded part), leaving a trefoil opening (Fig. 3 *D*).

Fourth Stage: The sutures are now inserted to close first the vertical wound (Fig. 3 *E*) and then the horizontal wound (Fig. 3 *F*), as previously described.

Stellate Keratectomy

This operation is chiefly indicated when the staphyloma involves the whole of the cornea, or when a central mushroom staphyloma has developed. It can be performed either with the knife and scissors or with the keratome and punch, as is preferred.

First Stage: A horizontal incision is made in the center of the cornea, with the Graefe knife or with the keratome (Fig. 3 *J*).

Second Stage: The upper and lower vertical flaps are excised with the scissors or with the punch (Fig. 3 *J*).

Third Stage: In like manner the two horizontal flaps are excised (Fig. 3 *K*).

Fourth Stage: Each section of the stellate[1] incision is closed by a single suture, and a central mattress-suture is finally inserted.

COMPLICATIONS

If, by chance, abnormally high tension should cause extrusion of the lens, or if vision can be improved by the removal of a cataractous lens, the loop or the silver spoon should be used for this purpose and the toilet of the wound made before tying the sutures. If it seems possible to improve the vision by iridectomy or by De Wecker's irito-ectomy, this may be done before the wound is closed, but *pari passu*, it is better to postpone such an attempt until after healing has occurred.

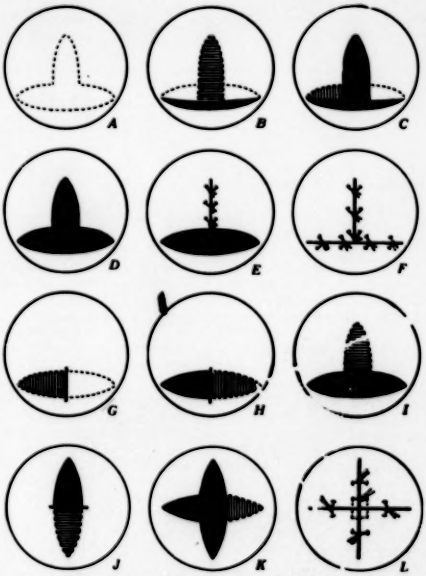

Fig. 3.—Incisions and sutures for both trefoil and stellate keratectomy; *A*, three-leaved flaps outlined; *B*, corneal incision below, *à la* Saemisch, shaded part of upper flap ready for removal; *C*, upper flap excised, left tip shaded; *D*, trefoil keratectomy completed; *E*, vertical wound sutured; *F*, both vertical and horizontal wounds sutured; *G*, vertical keratome incision for punch operation, left flap shaded; *H*, left flap excised, right shaded; *I*, right and left flaps excised, upper flap shaded; *J*, horizontal keratome incision for stellate keratectomy, upper flap excised, lower one shaded; *K*, upper, lower and left flaps excised, right flap shaded for removal; *L*, stellate keratectomy completed and sutures inserted.

POSTOPERATIVE TREATMENT

Mercuric chlorid ointment should be inserted into the conjunctival culdesac and a light bandage with a cresol solution compress adjusted. A slow-healing wound may be stimulated by touching it with a weak solution of silver nitrate. An infected wound should have an application of liquor formaldehydi, 0.5 per cent., and ice-pads should be applied. A wound that

1. Since preparing this paper my attention has been called to the star-shaped incision of Attias, recently devised and published in the Ophthalmoscope, January, 1914. His sutures cross over from the upper right flap to the lower left flap and vice versa.

slightly gapes or shows other irregularity should receive a gentle touch with the hot galvanocautery point.

REPORT OF CASES

I shall briefly cite three interesting examples of this keratoplastic procedure in types that are quite diverse, the first occurring in an extremely attenuated cornea that had yielded to a superficial necrosis through the erosive action of a blennorrhea, the second in a cornea that was practically normal except in the ectatic area involved, and the third in a cornea that was greatly thickened by plastic deposit and made staphylomatous by the increased intra-ocular tension behind it.

CASE 1.—Margaret M., aged 19, was first seen by me during an attack of typhoid fever, March 17, 1895, in consultation with Dr. George Morley Marshall, the present otologist at St. Joseph's Hospital, who was at that time in charge of the medical service. There was primary infection of the ethmoid and antrum, with secondary involvement of the ears and eyes, the former through an infectious otitis media purulenta and the latter through a profuse blennorrhea of the lacrimal sac, which kept both eyes bathed in a purulent discharge in spite of free irrigation and ice-padding. The left eye showed multiple areas of corneal ulceration with some ectasia. The cornea of the right eye was markedly involved by sloughing keratitis. One week later it was found necessary to perform a Saemisch incision in the right eye to check the corneal slough, but the globe proceeded to shrink and was finally enucleated, June 10, 1895, at which time rapid dilatation of both tear-ducts was performed, *ad maximum*.

Oct. 28, 1895, an examination of the left eye showed adherent leukoma with marked anterior staphyloma, the ectasia being very thin and bulging forward below, as illustrated in Figure 1, while a small area of clear cornea was still preserved along the upper margin. The eyelids could not be closed over the staphyloma. The vision was limited to light perception and light projection. There was no discharge present.

Fig. 4 (Case 2).—Result of keratectomy in the right eye; clear cornea above; flat leukoma below; final vision 20/100.

As the patient had been able to count fingers before the pupil was drawn into the scar, and as the globe seemed to be healthy, I decided to make a plastic operation on the cornea. Ether was administered and trefoil keratectomy was performed, the primary incision being made with a Graefe knife through the base of the staphyloma, after which a large vertical flap was cut out with the scissors and the two lateral tips later excised. The iris was freed from above. The corneal wound was closed by fine black silk sutures, the vertical first, and the horizontal last. Healing was uneventful and the cornea became nicely flattened. Vision had recovered to the degree of 10/200 at the time of patient's discharge from the hospital.

CASE 2.—Mary McC., aged 19, applied to Wills Eye Hospital March 20, 1908, suffering from corneal staphyloma of the right eye, down and in. Scar was somewhat weakened at lower margin. Cornea was clear above. The globe was not involved. Tension + 1. Iris was adherent to the scar. The lesion was the result of a blow received during childhood. Iridectomy was performed by me four years ago.

April 24, 1908, patient was admitted to the hospital during the internship of Dr. J. Milton Griscom, at present assistant surgeon to the hospital, to whom I am indebted for these notes. Trefoil keratectomy was performed and the wound sutured.

May 1, 1908, sutures were removed.

Fig. 5 (Case 3).—Large leathery staphyloma excised in the right eye, leaving a well-flattened cornea.

May 3, 1908, shallow anterior chamber, due to a small break in the line of the wound.

May 5, 1908, deep anterior chamber. Wound closed.

May 20, 1908, patient was discharged cured. Cornea was firm and flattened. Vision 20/100. The present appearance of the right eye is well shown in Figure 4.

CASE 3.—Alphonso R., miner, aged 47, came to Wills Eye Hospital, Dec. 4, 1908, with ulcerative keratitis and adherent leukoma, the result of severe traumatism from a flying piece of steel, six weeks before. Perforating ulcer, 3 by 4 mm.

Dec. 6, 1908, Stilling's operation with lead style and rapid dilatation of tear-duct was performed to eliminate the danger of lacrimal infection.

Jan. 13, 1909, iridectomy was made for visual purposes.

Jan. 29, 1909, patient was discharged without visual improvement.

July 12, 1909, patient returned with large staphyloma of cornea at the site of the old scar. Marked interstitial thickening of the cornea, which resembled leather in looks and feeling. Tension was + 2. Under ether anesthesia three triangular areas were excised with the corneal punch (trefoil keratectomy) and the necessary sutures inserted. The sudden release of intra-ocular pressure caused the lens to be extruded, but no other complication ensued.

Aug. 20, 1909: Recovery was uneventful. Patient was discharged with a well-flattened scar but no improvement in vision. Figure 5 shows the appearance of the eye at that time.

1625 Walnut Street.

ABSTRACT OF DISCUSSION

DR. JOHN GREEN, JR., St. Louis: The surgery of corneal staphyloma dates from the Alexandrian period of Greek and Roman civilization. It is not surprising that these beauty-loving peoples should have devised methods to diminish a deformity which, in its higher degrees, is irksome to the victim and repulsive to those with whom he comes in contact. The method adopted was that of ligation: A needle bearing a doubled thread was passed through the base of the staphyloma; the needle then was cut off, and the tumor tightly enclosed within the bight of the thread above and

below. The method was modified by passing needles similarly armed, at right angles, then tying off the tumor in four sections. Beer, in 1805, proposed and practiced simple abscission, without suturing the gaping wound. Critchett, 1863, in order to retain a part of the vitreous, passed curved needles through the sclera and ciliary body, entering above and emerging below the staphyloma, which was then abscised. Knapp, 1868, modified the method by quilting his sutures horizontally through the conjunctiva and episclera. DeWecker, 1873, circumcised the conjunctiva at the base of the staphyloma, abscised the protruding mass and drew the conjunctiva together with a purse-string suture. The outcome of these various operations is often very satisfactory: a globular mass of varying size, freely movable by reason of undisturbed muscular attachments. The artificial eye is often remarkably lifelike, fully as prominent as its fellow and with really extraordinary lateral and vertical mobility.

It has been contended, and with some justice, that in the case of laborers, a blind eye, even though unsightly, that is painless and free from congestion, is better for the individual than the best prothesis. If then, a protruding staphylomatous mass can be flattened by operation, and the result be a quiet blind eye, only disfigured by a flat scar, it is pertinent to inquire whether such a procedure may not only be justifiable but also definitely indicated. For partial staphyloma Dr. Ziegler's trefoil keratectomy appeals to me as an excellent measure. It seems possible that the technic might be simplified by omitting the approximating sutures and covering the cornea with a double pedunculated conjunctival flap. Possibly a double overlying flap, drawn from either side of the cornea (similar to Francis' double flap for scleral wounds) might serve still better. More and more ophthalmic surgeons are using these flaps to great advantage in both linear and jagged wounds of the cornea, and I see no reason why such a flap should not be serviceable in the condition under discussion. The indications for stellate keratectomy for total staphyloma in a blind eye seem to me far less clear. I should feel that an eye so operated on was somewhat of a menace to its fellow. I should prefer either to leave it alone or to enucleate, with a fat, glass or gold ball implantation in Tenon's capsule.

DR. JOHN E. VIRDEN, New York: I have had no experience with Dr. Ziegler's operation, but in connection with partial staphyloma I have had recently two or three pleasing experiences without surgery in cases of early staphyloma of the cornea, in which I followed a suggestion I read, by some foreign authority; that is, the dropping into the eye three times a day of a 1:1,000 epinephrin solution, which reduces the tension and allows nature to fill up the gap. I have had two very beautiful recoveries from that procedure.

DR. S. LEWIS ZIEGLER, Philadelphia: With reference to the use of epinephrin in the treatment of staphyloma, this suggestion was made by my colleague on the staff of Wills Hospital, Dr. Paul J. Pontius, who published a series of cases in the *New York Medical Journal*, Sept. 28, 1912. It is a most excellent procedure, but the preparation must be used in full strength (1:1,000) and instilled 3 times a day. It is chiefly applicable to cases of partial or total slough of the cornea, where suppuration has ceased and ectasia is just beginning to manifest itself. Under this treatment the regenerative process will so stiffen the cornea as to prevent the formation of staphyloma. It has proved very successful in my hands. The conditions that I referred to in my paper were not the conditions that Dr. Green mentioned in the first part of his discussion. I was not referring to staphyloma that involved more than the corneal tissue and did not intend to include staphyloma that extended into the ciliary region. The suggestion of covering the wound with conjunctiva I think is an excellent one, if the technic of Kuhnt is followed. On the other hand, there are many cases in which the cornea is so stiffened by reduplication of tissue and formation of plastic deposit that the wound when it is incised does not coaptate and you must draw it together with a suture. The sutures can be put in by my method, by Kalt's or by any of the others. I do not think that we have anything to fear from the use of sutures in this character of tissue, or in other types of leukomatous cornea. They have been used very freely and successfully. I have nothing further to add to the operation except to say that I feel sure those who will try it in the cases indicated will find it a successful procedure, without danger of complications and with great benefit and satisfaction to both patient and surgeon.

IMMUNITY IN MEASLES

CHARLES S. WOODS, M.D., IOWA CITY, IOWA

Hektoen[1] concluded from his study of experimental measles that "the virus of measles is present in the blood of patients with typical measles some time at least during the first thirty hours of the eruption."

It would seem that Hektoen's experiments prove beyond a doubt that measles may be transmitted by injecting the blood of a person having measles into another person in normal health. One would expect, therefore, that infants *in utero* would be liable to contract measles if the mother should happen to have the disease during pregnancy. I wish, therefore, briefly to relate an observation which I have had the opportunity of making on this point. About seven years ago I called to see a woman who presented the usual signs of measles. She had never had the disease. Two children in the family were just recovering from it. She was in the eighth month of pregnancy. I was greatly concerned and hourly expected a premature birth of the child. The attack of measles was quite typical. The patient was very uncomfortable, chiefly because of the bronchial involvement. She passed through the attack without any unfavorable results. About three weeks later I delivered her of a normal child.

I supposed that the child had acquired the disease from the mother, and perhaps he did. Only recently, however, I have received word from the father that the child had a rather severe attack of measles this spring. And while it is true that measles may attack a person a second, and even a third time, this child while *in utero* must have had the most ideal opportunity for acquiring immunity against this disease. It is generally believed that if a pregnant woman is infected with syphilis late in pregnancy the child usually escapes.

It is impossible to say that this child did not have measles *in utero*. Children have been born with measles, small-pox and certain other diseases which were certainly contracted from the mother.

This case emphasizes the very great difficulty in securing immunity, as well as the remarkable power of the virus of measles to invade the human organism.

RETROPERITONEAL HERNIA DUE TO AN ABERRANT MIDDLE COLIC ARTERY*

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TORONTO

Retroperitoneal hernia is not a common condition, but it occurs with sufficient frequency to warrant a very careful study of its cause, the symptoms it may produce and its treatment. A critical analysis of the whole subject will be found in the monograph written by Sir Berkeley Moynihan entitled "On Retroperitoneal Hernia," a second edition of which was written

* Read before the Section on Surgery, General and Abdominal, at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Hektoen: Experimental Measles, Jour. Infect. Dis., 1905, ii, 238.

in collaboration with Mr. J. F. Dobson in 1906. This work contains a very complete bibliography, and the author has narrated in detail many of the cases which have been recorded in the literature. The etiologic factor responsible for the production of this class of hernia has, in the vast majority of instances, been demonstrated to exist in the numerous peritoneal folds and fossae which are produced in the normal development of the intestinal tract and its serous covering. These folds and fossae are formed mainly in four distinct regions. They are as follows:

1. Duodenal folds and fossae in the region of the duodenojejunal juncture. Here we have, in addition to a few extremely rare types, the two chief varieties of (*a*) "left duodenal hernia," and (*b*) "right duodenal hernia."

2. Peritoneal folds and pouches in the region of the cecum and vermiform appendix. These are responsible for a considerable variety of cases of "pericecal hernia."

3. The fossa at the base of the mesentery of the sigmoid flexure of the colon. Hernia into this fossa has been described from time to time.

4. The region of the "lesser sac" of peritoneum and the foramen of Winslow. Hernia occurs into the lesser sac of peritoneum through the foramen of Winslow, or again there may be hernia into the lesser sac through an abnormal aperture, as through the lesser omentum, the gastrocolic omentum, the great omentum or the transverse mesocolon.

Among the earlier writers on this subject we have Treitz, Waldeyer, Eppinger, Toldt and Jonnesco. The Hunterian lectures of Treves in 1885 on the anatomy of the intestinal canal and peritoneum in man make a well-known monograph containing a study of the peritoneal fossae. Again Huntington in his exhaustive and beautifully illustrated work on "The Anatomy of the Human Peritoneum and Abdominal Cavity Considered from the Standpoint of Development and Comparative Anatomy" (1903) gives us an account of the various fossae concerned in these forms of internal hernia. The writings of Lockwood and Rolleston and of Berry on this subject may also be referred to.

The frequency of retroperitoneal hernia may be judged from the fact that Moynihan was able to collect from the literature 68 cases of left duodenal hernia, 17 cases of right duodenal hernia, 19 cases of pericecal hernia, 2 cases of intersigmoid hernia and 12 cases of hernia into the foramen of Winslow.

The case recorded in this paper is possibly unique, occurring as it does in connection with an extremely rare abnormality, namely, the existence of an aberrant origin and course of the middle colic artery. In this instance the artery in question arose from the right common iliac artery and proceeded upward to its destination in the transverse colon. In relation to this aberrant vessel a peritoneal pouch was developed which contained the whole of the small intestine. The case is of further interest because, while apparently all cases hitherto recorded were either found accidentally post mortem, or at operation performed for symptoms caused by the hernia (frequently strangulation), in the present instance an operation was undertaken for digestive disturbance due to an hour-glass stomach, and the retroperitoneal hernia found on opening the abdomen was not accountable for any symptom whatever save a slight degree of ileostasis which appeared in the Roentgen-ray findings.

The history of the case is as follows:

J. H., man, aged 60, complained of epigastric pain for three years. As a rule the pain came on some hours after eating, but in this respect the history was somewhat vague. Eighteen months prior to operation he had a severe attack of hemorrhage, vomiting a large quantity of blood, and for several days subsequently blood was passed in the stools. This was the only time at which he suffered from hemorrhage. He had lost weight and there was an excess of free hydrochloric acid in the gastric analysis. There was a tumor situated immediately above and to the left of the umbilicus which, on examination, seemed to be incorporated in the left rectus muscle. The tumor was oval, its long axis being vertical. It was about the size of a large lemon. Roentgenograms after a bismuth meal showed an hour-glass contraction of the stomach with a marked permanent incisura toward the cardiac end. A condition of ileostasis was also noted.

A diagnosis was made of gastric ulcer with cicatricial contraction producing an hour-glass stomach. It was also

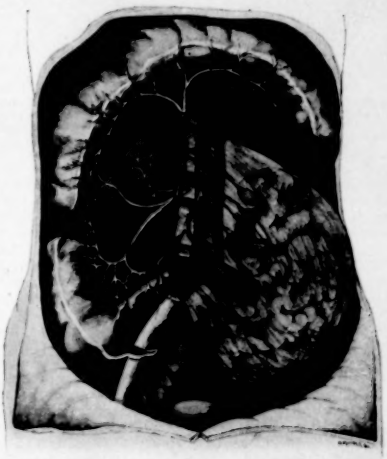

Fig. 1.—Retroperitoneal hernia due to an aberrant middle colic artery. The artist has represented the sac as if it were transparent in order to indicate its relations as described in the text.

suggested that a chronic infection of the abdominal parietes had extended from the ulcer, following in all probability a slow perforation with adhesions.

The abdomen was opened, the stomach was found adherent to the parietes and the left rectus muscle for about 4 inches of its extent converted into dense cicatricial tissue which cut almost like cartilage. In the attempt to separate the stomach the cavity of that viscus was opened. A clamp was laid flat on the anterior surface and closed so that the adherent portion of the stomach was isolated and further leakage prevented. The stomach was separated from the parietes by removing a slice of the cicatricial tissue of the parietes along with it. A partial gastrectomy was performed between Payr's gastrectomy clamps, and the affected portion of the stomach removed. Immediate anastomosis of the remaining parts of the stomach was now done and the abdominal parietes closed.

This patient exhibited a remarkable condition of internal hernia in which the entire small intestine was contained in the hernial sac. When the abdomen was first opened no small intestine was visible, but one found a large flabby sac

occupying a position chiefly in the left lumbar region and extending deep down into the pelvis. The opening of the sac lay immediately to the right of the middle line and was bounded anteriorly on its free margin by a structure which extended from the brim of the pelvis upward towards the transverse colon. On picking up this structure, which felt like a thick cord, one was surprised to find that it pulsated and thus it became obvious that a large artery formed the margin of the opening. By pinching the vessel at two points separated from one another by about an inch, it was quite easy to determine by compression the direction

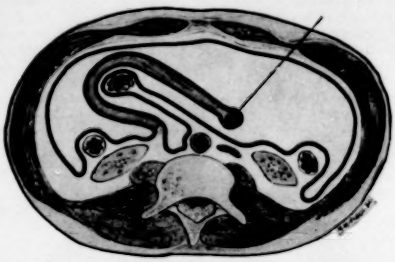

Fig. 2.—Retroperitoneal hernia due to an aberrant middle colic artery (indicated by the arrow). Diagrammatic representation of a transverse section illustrating the relations of the folds of the peritoneum forming the sac.

of the blood-flow within the vessel. Pinching at a lower point obliterated the pulse above, while pinching it above had no effect on the pulsation below. It was quite obvious that the current was from below upward, and on further examination we determined that the artery arose from the right common iliac. On examination it also became quite obvious that the artery was distributed to the transverse colon and in fact was an aberrant middle colic artery.

On examination of the peritoneal sac one found that, with the exception of about 2 inches of the lower end of the ileum which passed out to join the cecum, the entire small intestine was contained within the peritoneal sac. The patient was apparently not suffering any inconvenience from the conditions which one found, and in the belief that in all probability this man, who was now 60 years of age, had had this hernia without inconvenience for the greater part of his life, and further because of the fact that it seemed almost impossible to obliterate the sac efficiently had one thought it necessary to do so, it was determined to leave matters as they were.

The patient made an excellent recovery from his stomach trouble and has remained perfectly well since the operation, which took place about six months ago.

The diagrams which I here reproduce (Figs. 1, 2 and 3) illustrate the position of the hernia and its relations.

The opening of the sac was quite large so that the fingers of one's hand could be thrust within it without difficulty. The intestine was quite readily pulled out of it and there was no constriction placed on the bowel—in fact, it seemed hardly possible for strangulation to occur. The fundus of the sac was quite free so that one could lift it up out of the pelvis, and it seemed as if one could almost shake the intestine out of its acquired bag. The descending colon lay behind the sac, the transverse colon above it and the ascending colon immediately to the right of its neck. The fixed point of the duodenojejunal juncture was entirely within the sac, lying under shelter of its upper portion, and the only piece of small bowel passing through the mouth of the sac was the terminal 2 inches of the ileum where it passed to the ileocecal juncture.

It would appear that the vast majority of cases of retroperitoneal hernia have a very intimate relation to the course of some particular blood-vessel; in course of development the blood-vessels lie in a retroperitoneal position, and as they course to or from the various viscera, which they supply with blood, they maintain their position in the same plane of tissue, passing between the two leaves of the mesentery in reaching the small bowel or running behind the posterior parietal peritoneum to reach such viscera as the ascending colon, which as a rule possesses no mesentery.

In the early embryo of the sixth week the intestinal canal runs a straight course and the blood-vessels are distributed to its various portions as branches of the aorta which proceed to their destination between two folds (right and left) of peritoneum, described as its mesentery. Subsequently this simple arrangement becomes complicated by rotation of the intestine and by the fusion of different layers of peritoneum. The result of these processes is to produce various folds of peritoneum and certain fossae related to these folds. These fossae normally persist in such localities as the duodenojejunal juncture, the ileocecal region, or at the root of the mesentery of the sigmoid. The free margin of the gastrohepatic omentum bounding the foramen of Winslow has a similar origin. In these

Fig. 3.—Retroperitoneal hernia due to an aberrant middle colic artery. A diagrammatic representation of a sagittal section illustrating the relations of the folds of peritoneum forming the sac.

regions therefore and in relation to these fossae, hernias are prone to develop, and the fossae are deepened as the pressure of loops of bowel is brought to bear on them until eventually large sacs may be formed, accommodating, it may be, many feet of bowel.

The fold bounding the neck of the fossa on its anterior or ventral aspect is usually occupied by a blood-vessel, and unquestionably the vessel is respon-

sible in these instances for the production of the fold and the fossa behind it. Hence in the neck of the sac in a retroperitoneal hernia we usually find a blood-vessel which forms its anterior boundary. Thus in "left duodenal hernia" the vessel found on the ventral margin of the orifice of the sac is the inferior mesentery vein to which is, as a rule, closely applied the left colic artery, forming the so-called vascular arch of Treitz. In right duodenal hernia the vessel concerned is the superior mesenteric artery. In pericecal hernia it is the ileocolic or ileo-appendicular artery which lies in the fold bounding the fossa. The sigmoid vessels are similarly related to the neck of the sac in "intersigmoid hernia," and one finds the hepatic artery and portal vein with the bile-duct bounding the foramen of Winslow on its anterior aspect.

We may assume that the aberrant middle colic artery in my case produced a peritoneal fold as it coursed from its origin from the right common iliac artery to its destination in the transverse colon. A fossa occurring in a position posterior to the fold would permit of the formation of a hernia. Hence in this instance the neck of the sac on its anterior aspect contained in its free margin the middle colic artery.

It is a point of great practical importance to note the fact regarding the relationship of large and important blood-vessels to the neck of the sac; otherwise, in cases of strangulation particularly, one might inadvertently sever the vessel in relieving constriction and thus jeopardize the vitality of a large amount of bowel.

The anomalous origin of a "middle mesenteric artery arising from the common iliac and supplying vessels to the transverse and descending colon" has been described by Hyrtl. I have been unable to consult his original paper but a reference to this fact will be found in Quain's "Anatomy," Volume II, Part 2, published in 1899.

Moynihan describes various methods which have been adopted in individual instances to relieve constriction in strangulated hernias of this type so as to deal with it efficiently and yet to preserve the important vessels concerned, without injury. Thus the sac has been opened at a point distant from its orifice. Distended loops of bowel have been punctured and emptied of their contents in order that reduction of the size of the bowel may be accomplished. The intestine is then dislodged from the sac through its orifice. Subsequently obliteration of the sac near its orifice is brought about by sutures introduced in such fashion as to prevent interference with the circulation of blood through the vessel. In one instance the inferior mesenteric vein at the margin of the orifice was cut across but it was found to be thrombosed — presumably collateral circulation had already been sufficiently established to prevent gangrene of the bowel, as the patient recovered.

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ABSTRACT OF DISCUSSION

DR. CHARLES A. POWERS, Denver: The rare condition which Dr. Primrose has described is unique, and I doubt whether we will ever see a similar case. Dr. Primrose wisely permitted this small intestine occupying the very large sac to remain where it had been lodged for several years. It was doing no harm and the patient made a good recovery. A man of lesser experience and less wise judgment might have attempted a radical cure of this hernia and thereby had a fatal result. The situation found was an unexpected one and emphasizes the fact that when we find conditions of this nature which have existed for a long time within the abdomen and which will probably do no harm, it is our duty to let them alone.

DR. WILLIAM B. COLEY, New York: I have had no experience with the particular type of intra-abdominal hernia described by Dr. Primrose. He has, however, referred to two cases of intersigmoid hernia reported prior to 1906. I believe my own case, published in the *Annals of Surgery*, July, 1909, is the only one observed in this country. Furthermore, I think my case remains unique from the fact that the hernia occurred in an infant 3 days old. The only symptoms were apparent pain (judging from the almost constant crying of the infant) and gradually increasing distention of the abdomen. When the diagnosis of intestinal obstruction was made, the condition of the child was too desperate to permit of operation. He died shortly afterward. I performed a necropsy, and found practically all of the small intestine in a retroperitoneal pouch in the intersigmoid fossa. An additional point of interest in my case was the fact that the intestine had ruptured and the whole abdomen was filled with its contents.

DR. E. WYLLYS ANDREWS, Chicago: The most valuable contribution we have in Dr. Primrose's paper is probably the one referred to by Dr. Powers, namely, the impossibility of radical operative procedure in many of these cases. What was not perhaps quite so forcibly emphasized as it might have been is the anatomic fact that every one of these retroperitoneal hernias is a constriction band formed by a blood-vessel. In the foramen of Winslow is the gastrohepatic omentum which contains the hepatic artery. It goes without saying that we dare not interfere with these structures in endeavoring to reduce. We have a left colic and the right colic form, and in all these cases constricting bands seemingly in the blood-vessels, the accidental injury or obstruction of which in relieving the band would cause a gangrene of a segment of the large or small intestine. So not only is it proved that it is the part of wisdom to let these alone when they are not causing obstruction, but it is equally true that it is impossible to relieve the obstruction sometimes when the hernial content is strangulated. We can only make some form of stoma. I refer to this in more detail in the Hernia Section of the American System of Surgery. Ample experience shows that a strangulated hernia, for example, through the foramen of Winslow, cannot be removed. The problem is then of saving life, and that can only be brought about by some method of anastomosis, external or internal. It may become the part of wisdom not to try to reduce the bowel, but to relieve its constriction and distention by some kind of a stoma or anastomosis, or by resection of the gangrene. This is further complicated in diagnosis by the fact that practically none of these cases has ever been diagnosed before operating. They are not hernias which are known and operated on as hernia. They come to us as cases of intestinal obstruction, for which we do an emergency operation. Therefore, in some respects, it seems as if they hardly deserved classification as hernia at all.

The Importance of Observation in Diagnosis.—Which is the worst error, to fail to observe certain conditions, or to observe them and interpret them incorrectly? In the writer's opinion, the first is much the worse error. Observation is a matter of patience, training and thoroughness, in all of which a man may improve himself, but the use which he makes of his observations is partly a matter of his mental equipment. True, he can train his powers of thought and judgment to some extent, but we vary greatly in the quality of our cerebral cells, and the saying of the father of medicince, "Experience is fallacious and judgment difficult," is always true. To observe correctly and decide wrongly is sure to happen to the best of us, but to observe carelessly happens only when we permit it.—Thomas McCrae, *Canadian Med. Assn. Jour.*

FURTHER OBSERVATIONS ON THE HEMIOPIC PUPILLARY REACTION OBTAINED WITH A NEW CLINICAL INSTRUMENT *

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The need of such a test as the hemiopic pupillary reaction, if it holds in cerebral cases any of the topical diagnostic possibilities originally suggested by Heddaeus and later elaborated by Wernicke,[1] is so great that no labor should be spared fully to estimate the value of every promise it may offer.

In a paper[2] before this Section last year a complete historical summary and bibliography were given of this subject and of the Wilbrand test.[3]

PREVIOUS OBSERVATIONS

It will suffice here to recall some cardinal points from the researches of previous observers. Most important was the work of Hess in clearly showing what a great stumbling-block the phenomenon of dispersion light within the eye media had been in both

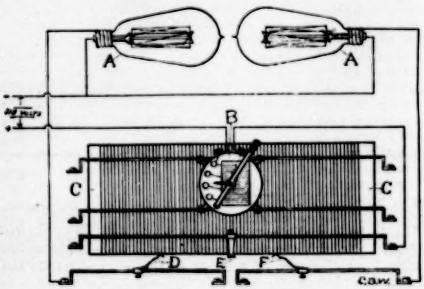

Fig. 1.—Diagram showing method of controlling lighting current in hemiopic pupillary apparatus: *AA'*, 60-watt tungsten lamps; *B*, rheostat controlling house current; *C*, slate slab wound with German silver wire; *D*, *E*, *F*, sliding contacts controlling current supplied to each lamp.

making and interpreting observations, and, since it has been frequently noticed in discussion that this phenomenon is still apparently a hazy concept to many, it may be worth while to dwell on it for a moment. By dispersion light is understood that light which in traveling the media of the eye is diverted by diffraction, refraction, etc., in all directions from the rectilinear path of the ray entering the eye. Dispersion light is strongest immediately about the image on the retina and decreases farther away from the image, but is still strong enough at right angles to the axis of the ray to render the path of the ray visible, if observed in a dark room through a trephined scleral window in the freshly enucleated eye. A somewhat similar phenomenon is commonly observed when a searchlight is seen playing about in different directions on a dark night or when a beam of light passes through water, especially if any turbidity is present. Dispersion light may also be observed in one's own eye entopically when a beam of light is so arranged as to fall entirely on one's blind spot.

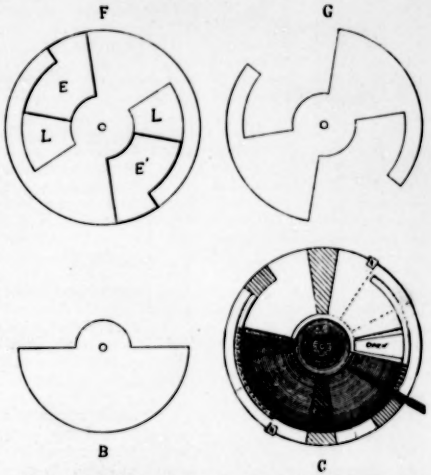

Fig. 2.—Plan of rotary shutter, assembled in *C* from segments *F*, *G* and *B*, in the position where the equal areas *L* and *L'* are cut down to about one-half full size.

Fig. 3.—Patient in position before the hemiopic pupillary apparatus. At the left a portion of the new apparatus for performing the Wilbrand test on these patients may be seen.

Hess, in one of his crucial experiments, placed a small light on a perimeter-like apparatus so that the light could be moved off or on the blind spot. The consensual pupillary reaction was noted by means of an entopic pupillometer on the other eye. He noted

* Read before the Section on Ophthalmology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* From the surgical clinic of Prof. Harvey Cushing at the Peter Bent Brigham Hospital, Harvard Medical School.

* On account of lack of space this paper has been abbreviated for THE JOURNAL. It will appear in full in the Transactions of the Section and in the author's reprints.

1. In the Wernicke reaction, as the phenomena was later commonly designated, a slender beam of light was thrown on the blind and then on the seeing retina of a hemianopic eye. Briefly, if there was no difference in pupillary reaction the lesion was central or posterior to the corpora quadrageminata and the reflex arc. While if there was a difference in reaction, the lesion was anterior or peripheral, interrupting the reflex arc from the blind retina to the sphincter iris.

2. Walker, C. B.: Topical Diagnostic Value of the Hemiopic Pupillary Reaction and the Wilbrand Hemianopic Prism Phenomenon, with a New Method of Performing the Latter, THE JOURNAL A. M. A., Sept. 27, 1913, p. 1152.

3. The results of further investigation of the latter subject are too space-consuming to be included in this report, but will be given later.

no pupillary reaction when the light was moved concentrically with the fixation point above or below the blind spot onto the seeing retina; indeed, sometimes there was a slight reaction in moving from retina onto blind spot due to reflection from the bright optic disk. If, however, the light was moved slightly toward the fixation point, a marked reaction resulted. Therefore he concluded that a small area about the macula contained all the pupillomotor fibers, so that when a ray of light was thrown on the peripheral retina, the resulting pupillary reaction was due to dispersion light stimulating the macula rather than to direct stimulation of the peripheral retina. Further, he showed that the exact center of the macula was the most sensitive point in the macular region. From a study of these facts it was at once obvious that previous observations were not at all well controlled with respect to dispersion light, the properties of which really constituted the crux of the whole situation.

This fact having been established, the next step was the production of a satisfactory instrument which would perform the test and at the same time control the dispersion light. The latter could not be dispensed with but could be made to affect the macula with constant strength in one of two ways: first, by rotating a light at fixed radius from the fixation point from blind to seeing field, and, secondly, in a "hemikinetic" manner, to use the term of Hess. This involves two equal areas of light, symmetrically disposed about the fixation point, and so arranged that each area may be exposed alternately as the other is closed. The intensity of the areas of life must be controllable about the point of photometric balance, and during the period of change the total area exposed must be constant and equal in amount to the full area of one of the lights. In this way the direction of the light entering the eye may be changed, but the amount of dispersion light reaching the macula remains constant.

Hess devised an instrument of sliding shutter type to accomplish this. Two equal vertical openings of rectangular shape equidistant from the fixation point were illuminated from behind through milk glass. The openings in the sliding shutter which exposed the two areas alternately were so placed that the moment one area began to be cut off the other area was exposed by the same amount. This fulfilled all the conditions except that of symmetry during the period of change, when light is cut off from one side of one area but added to the opposite side of the other area, as is of necessity the case with all plain sliding shutters. The result of this arrangement may be a pupillary jump during the change, since at that instant more dispersion light reaches the macula from one light by addition than is subtracted from the other light. This is most obvious in the mid-position when the two half areas are found to be asymmetrically disposed with respect to the fixation point by exactly one-half the width of either area. Sliding shutters which will be light-tight have a tendency to stick at times and the resulting movement of the whole instrument is then such as to produce an oscillating series of asymmetrical positions. Further to minimize these objections, the areas have to be made as narrow as possible so that a pupillometer must be used to make observations satisfactorily, on account of the low intensity of direct illumination.

In order to obviate the difficulties of symmetry, the rotary shutter described in my last communication was devised and two or three hemiopic reactions were observed with it, but while it solved the problem of symmetry well enough, it was small, crudely made and poorly lighted as compared with the present instrument, so that a pupillometer was necessary to make observations in most cases.

DIFFICULTIES WITH RECENT METHODS

This last point brings up a consideration of some of the difficulties encountered in making observations with the various forms of pupillometers. Questions of pupillary illumination or of observation ability on the part of the patient form a basis for most of these difficulties.

Thus in the entopic pupillometer the patient observes his own consensual pupillary reaction. A dispersion circle limited in size by the pupillary margins is projected on the retina by an encapsulated point source of light fixed close to the eye and with all extraneous light excluded. Any change in the size of the pupil is noticed as an enlargement or contraction of the retinal dispersion circle which is projected into space as a sort of moon or round window of light surrounded by darkness. While the patient notices this phenomenon and reports on it he must also keep his other eye carefully on the point of fixation and pay no attention to the shifting lights in the field of vision. If a field defect is present in both eyes the entire dispersion circle will not be seen except by special arrangement, such, for instance, as was used on the instrument presented last year.

While this method is the most sensitive we have, it has the common error of all monocular pupillometers of damping, as it were, pupillary dilatations, since as dilatation comes on more light is admitted to the eye, producing a tendency to contraction. Conversely, when pupillary contraction comes on, it is exaggerated, more light being excluded. But still more confusing is the peculiar pupillary bounce present at all times with most patients, and probably augmented by the preceding factors together with psychic or perhaps accommodative reflexes, although no change in light intensity has taken place. Altogether, the mental and physical condition of patients with field defects resulting from brain tumors is usually such as to inhibit the individual attention necessary for trustworthy observations with entopic method.

With the objective method, the monocular pupillometer being used, the main difficulty arises from the amount of light necessary to give a good view of the pupil. This degree of illumination is about the same in amount whether it be from the light in a pupillometer such as described in the previous paper,[3] or whether it be daylight or light from any source whatever, and the amount is such that as soon as the pupil is properly illuminated, it is at the same time markedly contracted. Under these conditions when a certain increment of light is added to the light already strongly contracting a pupil, the reaction may be hardly perceptible, while if the same increment of light is thrown on a dark adapted retina the reaction will be very noticeable. If the test lights used on the other eye are not of considerable strength, the stimulation may not be, in certain cases, sufficient to travel the consensual route and override the strong stimulation already present in the consensual eye sufficiently to

give reactions that can be interpreted as other than equivocal or negative.

The logical sequence of these considerations was the desire to construct an instrument which would utilize the same light, necessary in any case for observation of the pupil, also to perform the hemiopic pupillary test. In addition to these requirements other desirable conditions to be fulfilled would be the possibility of varying the size of the areas symmetrically within all necessary limits and of rotating either area about the point of fixation from the blind to the seeing field. Further, both lights should be under complete control so that the intensity of either one could be varied above or below or made exactly equal to that of the other, or that the intensity of both could be varied together without disturbing the ratio of intensity between them. Such an instrument would also come much nearer satisfying the demands of a routine clinical instrument since the usual pupillometer trappings could be dispensed with, or used at will, and the pupillary reflex directly observed. Accordingly, somewhat over a year ago an instrument, of which a description follows, was constructed to meet, as well as possible, the imposed conditions.

THE NEW INSTRUMENT

A diagram of the necessary light control is shown in Figure 1. The lights, *AA'*, are new 60-watt tungsten filament lamps selected from a large stock as nearly equal in all measurements as possible. From the wiring scheme it will be seen that they are connected in parallel. One side of each is directly connected to one side of the house current (110 volts). The other side of each lamp is likewise connected to the other side of the house current but must first travel through a set of resistances. The whole current first passes through a rheostat, *B*, whereby it may be varied in five steps from nothing to full strength. From the rheostat, the current then passes to the fixed bar of the sliding contact, *E*. This sliding contact, together with similar contacts *D* and *F*, may be moved laterally in contact with the edge of a slate slab *C* measuring 1 by 12 by 8 inches and wrapped with No. 26 B & S gage (0.016 inch diameter) German silver wire, the interval between the turns of the coil being about 0.2 cm. This size of wire was found by experiment to have the necessary resistance to regulate the individual lamps, and still would not burn out under the contacts, with ordinary care. From the contact the current divides, passing through a variable amount of resistance to contacts *D* and *F*, and thence through their individual fixed bars, and on to their respective lamps. If now we wish to decrease the intensity of the light *A*, we have simply to move the contact *D* farther out or to decrease *A'* move the contact *F* farther out. If now with either of these contacts at any distance we wish to produce further change in the relative light intensity, we may simply move the contact *E* between the two contacts *D* and *F* until the desired point is reached without adding extra resistance but merely readjusting that already in use. Thus, if necessary, we can throw the whole or any part of the resistance on the slab *C* into the circuit of either light or divide it between them in any ratio. For purposes of measurement, the slab resistance is divided into ten divisions (points) each way from the center.

These two lights are encased end to end in the diameter of a heavy tin drum of about the size of an ordinary snare drum (14 inches diameter by 6 inches depth). Access to the interior is allowed by two doors in back. The inner surface of the drum is enameled white, and has two movable partition wings of the same curvature as the circumference so that when not in use they can be made to lie flat against the curvature of the drum. When it is desired to prevent one light from contributing more or less to the other, these wings may be turned inward to a corresponding degree or may be moved until they touch the axle for maximum effect. This axle in the center of the drum is hollow and acts as a hub posteriorly to receive the fixed axle on which the whole drum may be revolved, but anteriorly it has two large holes bored in it to transmit light to the fixation point, and still farther forward acts as an axle for the movable segments of the rotary shutter, which makes up the front of the drum.

The rotary shutter is an elaboration of the same type as that previously described. The segments (Fig. 2) necessary to make up the shutter were cut out of heavy tin, although a similar weight in sheet brass would probably have worked up with less tendency to warp. The first disk, *F*, has two equal openings *L* and *L'*, the shape being such as to give the maximum area for the minimum movement of the shutter. The inner margin of each area is on an arc of 1 inch radius from the center and the outer margin on an arc of 5½ inches from the center, at maximum opening an arc of 45 being subtended. On the quadrants, *E* and *E'* is placed another segment of size and shape to fit the interval left by the next superimposed segment *G*. Thus a smooth surface is provided for the shutter to move on below, and above the proper level is obtained on which to solder an overhang under which the shutter may pass and give a light-tight closing. The back of this disk carries two plates of milk glass covering the openings. The anterior end of the hollow axle also has a milk-glass window on which is marked a letter *A* and a dot, serving as a fixation point.

The next superimposed segment, *G*, serves mainly the purpose of symmetrically regulating the size of the lighted areas, but at the same time it carries two circular arms extending along the outer margins of the lighted areas, forming a smooth course on which the edge of the shutter may travel under cover of another overhang providing a light-tight margin. This disk is not fixed to the drum as the first one is, but is free to rotate when the clamps holding it to the first disk are loosened. The shutter is a semi-circular disk, *B*, actuated by a jointed hand lever, as is shown in the assembled shutter *C* drawn in the position where the lighted areas *L* and *L'* have been cut down to about one half their full size.

To eliminate any asymmetry that may be due to reflection from the patient's face, a wide, short cone, truncated to fit the patient's eye, is provided on an adjustable support, so that the distance from the fixation point can be varied within any desirable limits, from 10 to 20 inches usually giving satisfactory illumination. A patient in position before the instrument is shown in Figure 3.

METHOD OF EXAMINATION

Before making any tests, in order to avoid as much as possible any psychic or accommodative changes or any tendency to loss of fixation, the patient is familiarized with the movements of the shutter, until the

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shifting of light areas ceases to be of interest. The room is then darkened to exclude all asymmetrical light, and with the shutter at mid-position or entirely open on the blind side, so that light adaptation may be kept equal, or as low as possible before the test is made, the patient is placed in position before the instrument with one eye covered, and the light is gradually increased until the movements of the iris can be accurately followed. This light strength varies slightly, depending on the color of the iris; it is greater for the darker irises. The patient is now told to sit back and close the eyes before proceeding with the observations, in order to increase the dark adaptation, which has a tendency to increase the difference in reaction, and to avoid fixation fatigue. Previously, of course, the lights have been photometrically balanced by means of the sliding contacts and further adjusted to the normal eye so that the pupillary reaction is the same from both lights.

Observation of direct pupillary reactions may be made with the unaided eye, or a short-focus telescope may be used. A very simple aid is made by rolling up a tube of stiff paper which will hold a magnifying glass in one and fit snugly about the observer's eye at the other end, thus at once cutting out shifting and somewhat confusing illumination on the observer's eye, and enlarging the pupillary movements. This tube may be held in the mid position to avoid asymmetrical reflections. Observation of the consensual pupillary reaction may be effected directly if all light from the instrument is screened off and limited to the eye under examination, by a heavy black conical curtain. Light is then admitted to the room until the movements of the consensual pupil can be followed, but without the use of the curtain the consensual pupillary reaction can also be observed objectively with the monocular pupillometer or subjectively with the entopic pupillometer previously described.

The rate of movement of the shutter has considerable effect on the resulting pupillary reaction. This holds true for the normal eye as well as for the hemianoptic eye. In general, on the normal eye if this change is made slowly from one light to the other no reaction may be noted if the accommodative and psychic reactions are not active. These latter reactions are very noticeable the first time a young person sits down to the instrument and simply fixes attention on the central point. If now the pupil is carefully observed with no change in light distribution one often notices in the course of the first minute or so decided variations in the size of the pupil. A noise or a spoken word may cause a distraction of attention or relaxation of accommodation with corresponding exaggeration of the normal hippus that may be noted for a time in absolute silence. These changes become reduced to a minimum as the patient becomes more and more at ease. In older persons whose accommodative reflexes are no longer active these reactions are much less noticeable if present at all. If a distant fixation point were observed through the hollow axle the condition would doubtless be better if it were not for the liability of the test-lights near at hand to stimulate accommodative reactions as they flash into view.

When these reactions are quiescent there may be no pupillary reaction if the lights are slowly changed, but if the change is suddenly made, we notice a quick pupillary contraction followed by a somewhat slower dilatation to the former size. This may be repeated on the return change if the interval is two or three seconds or more. As the interval is decreased to the neighborhood of one second or less the pupillary contraction and dilatation becomes less until the interval is of such length that the pupillary reaction apparently does not have time to take place, either on account of the time required for transit of the reflex arc or for light adaptation phenomena. While it might be due to a combination of the two the interval is such as to favor light adaptation as an explanation. Symmetry of distribution on both sides of the macula is not necessary. The same thing happens if the lights are turned into the vertical position and a point a short distance out on the horizontal line through the center is taken as an eccentric fixation point. These reactions obtained on the normal eye are the same from either light when the instrument has been adjusted.[4] This same reaction may be elicited when the two lights are placed in the seeing field of a hemianoptic eye. But in any case, if the eye is allowed to fix a very short distance — a centimeter or less toward either light, for instance — so that asymmetry enters, a difference in pupillary reaction is noticeable.

In examining hemianopic cases the most satisfactory interval of alternation seems to be that which gives the maximum noticeable pupillary movement and seems to be about the same interval (2 or 3 seconds) as that at which the pupillary bounce is most active in the normal eye. The rate of change from one light to another is made as rapidly as possible for the same reason. In some cases in which the hemiopic pupillary reaction is marked, however, it is difficult to mask it with any kind of a shutter movement. Again, when the reaction is not marked, blinding the macula may be resorted to as a means of intercepting the reaction. A piece of heavy black paper having a circular hole an inch or two in diameter is held over one of the light areas and the patient told to look steadily at the center of this spot of light until looking at the center of the instrument fixation can still be maintained in spite of the blinding.

In order to get an idea of the magnitude of a hemiopic pupillary reaction, aside from measuring the pupillary sizes, two methods were used which gave relative results: first, the amount of resistance necessary to cut one light down to the point at which the reaction was the same from one dim light and one bright light. With the second method, the size of the areas was cut down until the consensual reaction could not be made out with the pupillometer on the other eye with any degree of certainty.

In addition to the use of the shutter with the lights in fixed position one light may be exposed and the whole drum rotated so that the light may pass back and forth from blind to seeing field at constant distance from the point of fixation performing concentric rotation tests, as was mentioned in the last paper. Concentric rotation of one light entirely in the seeing field, however, may give a psychic as well as light adaptation contraction of the pupil; so that this movement must be repeated several times with patients in order to reduce the psychic element as much as possible by thorough familiarization with the procedure.

4. In all cases with eccentric fixation, the shutter movement must be as rapid as possible, for, although the total areas in the mid-position of the shutter are symmetrical, there are two periods of asymmetry during the change before and after the mid-position, but these give stimuli in opposite directions so that the total effect balances well with rapid motion.

Cases with relative central scotomata and vision in the neighborhood of 20/200 can be assisted in fixation by sticking a white paper ring symmetrically around the fixation point. With this aid almost all cases can make out the center. At all events, if there is any tendency to look to one side of the center, it is of such direction as to reduce and not to increase a hemiopic pupillary reaction.

Fourteen cases of both anterior and posterior lesions were carefully studied. Their histories, examination and field charts are given in full in the transactions of the section and in the author's reprints, but cannot be given here on account of space limitations. The results of this study may be here summarized as follows:

SUMMARY

From a study of these cases it would appear that the idea of using relatively strong symmetrical illumination has not been an unfruitful method of examination for the hemiopic pupillary reaction. In fact, it has been rather disappointingly fruitful from a standpoint of clinical diagnosis, since apparently a very similar type of reaction has been found in cases of both anterior and posterior lesions.

In the most characteristic form of the reaction, there is, with central fixation on the rotary shutter, no pupillary bounce whatever, as light is changed from the seeing to the blind field, with any rate or interval of shutter movement. The pupil simply dilates slowly in the course of two or three seconds, being somewhat more suggestive of a pupil being released from the effects of light adaptation, than of an ordinary pupillary dilatation as usually seen in a light reaction test. On changing back to the seeing field there are two kinds of reaction according to the rate of shutter movement. If the change is slow so that light adaptation may have time to take place to a certain extent, the pupil will slowly contract to a certain size. If, however, the shutter movement is very rapid, the pupil contracts with a sudden jerk to a size smaller than with slow movement, and it dilates as light adaptation comes on, to a size about the same as that with the slow shutter movement. This effect of light adaptation varies with the strength of illumination used, being much more marked with the strong illumination used in direct examination than with the weaker illuminations which may be used in consensual examinations.

In addition to this characteristic type of reaction there are those cases in which there is only a slight pupillary bounce when the light changes to the seeing field, but the pupil is noticeably larger with the light in the blind field than when in the seeing field. Finally, as the reaction becomes equivocal, it is noted that without distinct difference in pupillary size at rest, there is a more marked pupillary bounce on one side than on the other.

These reactions in their various stages have been found in anterior lesions as well as in posterior lesions. Indeed, one of the most striking examples was in a posterior case. The phenomenon has been found in rather early stages of incomplete hemianopsia of both bitemporal and homonymous types. It has been found in tract and chiasmal lesions both with and without relative central scotomata.

The topical diagnosis in the cases presented is without question in the anterior group of chiasmal and tract lesions. In the group of posterior cases the diagnosis is almost as certain, though without necropsy it would not be possible to say absolutely that there was no involvement of the pupillary tract, or of the primary ganglion centers. In addition to this rather slight ray of hope, there is the possibility in some of the cases that secondary degeneration may have affected the pupillometer tract as has been suggested by Rothman. In this connection it would be extremely interesting to follow for from six to eighteen months the pupillary reactions in a very early case of hemianopsia due to capsular apoplexy.

Previously we have been contending largely with the problem of dispersion light, but now, having disposed of that problem more or less satisfactorily, we are evidently confronted by a still more serious complication in the retinal properties of light and dark adaptation. One can blind one half of the retina by looking at the edge of a large bright surface and obtain a difference in pupillary reaction in the normal eye with the rotary shutter. Indeed, the action of the normal eye with direct test on the rotary shutter shows the complication of light adaptation. In complete homonymous cases of whatever origin, Cushing has long noted a large pupil in the eye having lost the temporal field, that is, having lost the greater area of active retina. I have seen this phenomenon several times and three such cases are given in this report. Two of them are posterior lesions. This pupillary status appears too constantly for a sympathetic phenomenon and it cannot be explained by assuming all the pupillomotor activity to be resident in a small macular area, nor does it agree with the idea that the reflex pupillary arc is still intact on the blind side in posterior lesions, even if it were known that the pupillomotoric area were quite large and extended farther on the nasal retina. It may be more easily understood when we consider the light and dark adaptative effect of the two unequal retinal areas on their respective pupils.

From the examination of these cases it would appear that the blind retina has, to say the least, either lost or decreased in light and dark adaptive effects on the pupil. If light and dark adaptive pupillary reactions exist merely as a regulating mechanism, and involve the presence of retinal pupillomotor activity, then we are forced to the conclusion that the retina must either be weakly pupillomotoric to a considerable distance from the macula (30 to 40 degrees), or it is pupillomotoric in a small central area which is sufficiently active, when split, to give a difference in reaction to that distance by asymmetry. In either case, the pupillomotoric activity must fail in the blind retina in order to give the results obtained in these examinations. This has occurred, apparently, in posterior cases against rule (obtained from certain rare cases of subjective blindness from posterior lesions with retained pupillary reactions) that hemianoptic posterior lesions do not disturb the pupillomotoric activity of the blind retina. Possibly the rarity of these cases offers an explanation, that is, that the percentage of cases in which the hemiopic retina is left intact pupillomotorically is no greater than in cases of subjective blindness from posterior lesions, where pupillary reaction is retained. However that may be, it seems reasonably certain that the light adaptive properties are sufficiently damaged in posterior cases of hemianopsia to give a pupillary reaction closely simulating the hemiopic reaction of the pupillary reaction of anterior cases.

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Aside from these difficulties, the possible complication of psychic reactions must also be considered. The concentric movement reflex which I have previously mentioned, and could demonstrate in many of these cases, is doubtless simply a light adaptation phenomenon from which the psychic element may be worn away by repetition. The precautions taken before proceeding to the examination aid considerably in eliminating psychic reactions. But the consistency with which the hemiopic pupillary reaction occurs and may be repeated, argues much against psychic complications of any importance. With good cases which could stand the strain of fixation for a considerable period, I have demonstrated the reaction to chiefs and colleagues time after time, as long as they cared to look at it, and none had difficulty in making it out with the unaided eye.

Indeed, in the most marked cases the reactions are so striking that with rough methods one would expect to find a semblance of the phenomenon, and such has been found to be the case. With a pocket flash-light or an electric ophthalmoscope sufficiently strong to give a good view of the pupil, one can get a distinct though not a marked difference in pupillary reaction whenever, on repeated trials, the light is flashed from roughly symmetrical positions on each side of the fixation point. If two flash-lights are held in symmetrical positions and flashed alternately, the reaction is still better but never as marked, or as constant as with the rotary shutter. The fact that the reaction can be detected in marked cases by rough methods both in the anterior and in the posterior cases has an interesting significance in considering the great variety of results reported by observers using these methods.

If the retina has a low grade of pupillomotoric activity or a combination of light adaptive and pupillomotoric properties to some distance from the macula, as my results seem to show, how may the work of Hess be explained? Hess threw a small light on his own optic disk and obtained no reaction by the entopic method when he moved the light above or below concentric with the macula, on to the seeing retina. In fact, sometimes he obtained a better reaction when he passed from the retina on to the bright blind spot because of more reflected light. It is obvious that if the retina about the blind spot had a pupillomotor sensitiveness practically equal to the stimulation of the macula by reflection from the blind spot itself, then the results of Hess could be obtained in the same manner but for an entirely different reason than he supposed, namely, that the peripheral retina had no pupillomotoric activity. Accordingly the size, shape and illumination of the equal areas of the rotary shutter were designed to get the maximum effect from as large an area of retina as possible, and still keep the dispersion light reaching the macular region constant. With this instrument the reflection from the blind spot simply balances its lack of pupillomotor activity, so that its asymmetrical location apparently has no effect.

Altogether from a careful study of the cases reported herein, apparently many conclusions may be drawn, of which the following would appear particularly justifiable.

CONCLUSIONS

1. A weak hemiopic pupillary reaction may be masked by the pupillometer light when observed consensually.

2. Light and dark adaptive phenomena, in addition to dispersion light, seriously complicate the hemiopic pupillary reaction.

3. The hemiopic pupillary reaction is definitely present in anterior lesions, when examined by the rotary shutter method.

4. The hemiopic pupillary reaction is also present in cases having every clinical evidence of being purely posterior cases, although necropsy examination is necessary to prove absolutely that there is no involvement of the optic tract or primary ganglion centers.

5. Although it may be concluded from the examination of these cases that the peripheral retina does possess a weak pupilomotor sensitiveness, there is no evidence that the hemiopic pupillary reaction has any topical diagnostic value.

I am deeply indebted to Prof. Harvey Cushing not only for kindly facilitating this investigation but also for generously allowing me the privilege of presenting this particular phase of his cases.

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ABSTRACT OF DISCUSSION

DR. WALTER B. LANCASTER, Boston: It seems to me that our views of the anatomy and physiology of the pupil reflex paths will have to be revised if these preliminary reports prove to obtain in case of further investigation. We hope that by another year Dr. Walker will have examined enough of these cases to establish certainly whether all posterior lesions as well as the anterior show this phenomenon. He has not attempted to theorize concerning what path the reflex follows. It is an important physiologic problem. Another revolutionary idea which seems to follow from Dr. Walker's experiments, is that the periphery of the retina as far at least as 30 degrees, has the pupillomotoric function as well as the central region. Hess would limit the pupillomotoric area to the central 15 degrees only. I think this a good time to say something in appreciation to Dr. Todd's recommendation for research work. It might appear that this piece of research work was in vain, because this symptom is proved to be of no diagnostic value; but the necessary knowledge of the literature and the exhaustive study of the various factors that come into this problem cannot fail to be of decided value in solving other problems the worker is sure to meet in practice. Of course the importance of proving that the Wernicke symptom has no diagnostic value is obvious.

SAFE AND SPEEDY EXTRACTION OF THE IMMATURE CATARACTOUS LENS FOLLOWING PRELIMINARY CAPSULOTOMY *

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The contentions embodied in this thesis are:

1. An ample, properly executed preliminary capsulotomy has, in mature cataracts, many advantages over immediate capsulotomy or capsulectomy.

2. In morgagnian cataract it enables one to make what is difficult otherwise, namely, an efficient opening in the capsule.

3. The extraction of the clear lens in high myopia is feasible by this method, and

* Read before the Section on Ophthalmology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

4. It will render immature cataract operable after a six-hour interval, leading up to a clean extraction.

These contentions are submitted in the foregoing order that their correlated value may be presented and that the subject-title shall receive final and full consideration. It is generally stated by most writers that the lens-capsule is a highly elastic membrane which, on section, curls outward. It is very doubtful if this statement be true; not as to its curling outward, which is thought to be due to another cause, but as to its elasticity. If it were elastic and under tension it would gape only to incisions at right angles to the lines of traction; that a crucial incision should gape would require elastic fibers radially disposed. This is simply a matter of physics. There is nothing to show histologically the presence of elastic tissue in the lens-capsule; on the contrary, it is a homogeneous hyaline structure which does not stain, nor has the most searching microscopic examination shown elastic fibers therein. Neither can the gaping of the capsulotomy wound be explained on the basis of inherent elasticity in the lens fibers themselves. To quote Tscherning, "The contents of the crystalline lens are composed, in the adult, of two parts: the nucleus, which cannot change its form, and the superficial layer which, on the contrary, possesses this faculty to a very high degree; its consistence is very nearly that of a solution of very thick gum." Quoting Hocquard, he continues, "The whole is surrounded by a capsule which is inextensible or very nearly so. In fact, the laws of dynamics and of finely coordinated muscular action elsewhere in the body demand that, for accommodation, the lens capsule shall be inelastic." In an address delivered in the University of Oxford, Sir William Job Collins says:

> The lens is truly described as very elastic in the sense of readily tending to resume its original form after the withdrawal of any force that has modified its form or volume. I should not be disposed to allow that the same elasticity is true of its capsule, though this is alleged by most authors. From a study of it in dissection and in operations, I should be more disposed to say, with Bowman, it is "a hard and dense structure and determines the exact outline of the lens." The capsule is composed of albuminoid substance not of elastic tissue and betrays no trace of cellular structure; on laceration it gapes and sometimes curls in a fashion suggesting that *it is held taut by the reefing lines that bind it to the ciliary processes.* [Italics mine.—H. E. S.]

Underlying the anterior capsule of the lens and forming with it an intimate union is the epithelial layer whose cells by elongation become lens fibers. The well-known reproductive faculty inherent in these cells, and that any epithelial residue left clinging to the capsule may by proliferation produce a secondary membrane, make imperative that as little as possible of this be left in the eye. A close examination of secondary cataracts will disclose a small opening in the capsule, lens matter at the periphery of the pupil and growing out into this new lens fibers in the visual aperture. Incidentally, this is one of the arguments against a capsulectomy. The foregoing, relative to the capsule, is germane to what shall follow when technic is taken up, to the explanation of what changes take place in the interval between capsulotomy and the extraction proper and to the question why, to secure such altered relationship, an ample capsulotomy is necessary. Reference to these will later be made.

A historical review of the operation of primary capsule rupture need not here be made, for Dr. Percy Fridenberg[1] has so exhaustively covered the ground in a paper read before this Section in 1912 that he leaves nothing to be added. I shall, however, avail myself of frequent quotations from this paper to adduce arguments in support of my several contentions.

It is a reasonable assumption that the lens-capsule is more or less adherent to the epithelial layer immediately beneath it; that it is non-elastic; that it is the traction of the reefing lines that causes it to gape when divided, and that, in proportion to the amplitude of such division, it will release itself from the underlying cortex. With no knowledge of the work of earlier investigators I worked out for myself many years ago a method of preliminary capsulotomy which had for its objects a knowledge in advance of the size of the corneal section to be required for an easy exit of the lens and to make certain an ample and sufficient capsulotomy with the maximum of precision and the minimum of risk. At this time the knife-needle of Knapp was being used but, finding with this that the making of the second limb of the crucial incision became next to impossible, because of early loss of aqueous and the obliteration of the anterior chamber, I supplanted it by a miniature scalpel of my own design which obviated this difficulty. A sketch of this is here inserted (Fig. 1).

I have in former papers gone over the matter to follow, but larger experience only makes more certain

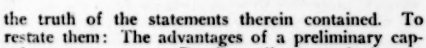

Fig. 1.—The capsulotomy knife.

the truth of the statements therein contained. To restate them: The advantages of a preliminary capsulotomy are many. By the ordinary method some of the difficulties are inherent in the instrument itself, but more and greater ones in the conditions under which it must be used. The straight capsulotome is kept sharp with difficulty. It cuts only when drawn toward the operator; at right angles to this it simply scratches. As soon as the section is made the iris contracts, the lens comes forward and the anterior chamber is abolished. Into this narrow space must be passed a straight instrument between cornea and lens; it is impossible to do this and reach below the anterior pole of the lens without pressing it more or less backward, and at this stage the lens, held only by its suspensory ligament, is mobile and easily dislocated. More than this, the operator in his zeal to make an efficient opening in the capsule is apt to rupture this ligament, and loss of vitreous ensues. There are no means of knowing that the capsulotomy has been inadequately performed until the lens, when pressure is applied to the globe, refuses to come forward. In this event, either the fixation forceps must be reapplied, a difficult and dangerous thing to do on an opened eye, or the cystotome reintroduced without its help, in the trust that the patient will keep still. Narrowing of the pupillary space by the contraction of the iris leaves insufficient room in which to work, and it is a difficult matter not to

1. Fridenberg, Percy: Preparatory Capsulotomy in Extraction of Immature Senile Cataract, THE JOURNAL A. M. A., Sept. 21, 1912, p. 1065.

wound it or entangle it in the tip of the instrument. If the bent cystotome of Knapp is used, these difficulties are enhanced, and not only are there greater obstacles to removing cortical fragments, but a peripheric capsulotomy leaves two thicknesses of capsule in the pupillary space and more often a secondary operation is required. Should blood enter the anterior chamber, the difficulties mentioned before are further increased. None of these difficulties accompanies a preliminary capsulotomy as described in this paper: 1. The knife can be made superlatively sharp, and efficiently cuts the capsule in both directions. 2. Only through the grossest carelessness can the suspensory ligament be ruptured or the lens dislocated, for this is held firmly in place by the vitreous behind and the aqueous in front. 3. Ample space is given through the dilated pupil, and the point of the knife may be kept fully in view during the division of the capsule, and, furthermore, the operator has the satisfaction of knowing that this is adequately performed. 4. The iris cannot be wounded or entangled in the instrument, and there can be no bleeding to obscure the field of operation. In brief, it simplifies and makes certain a step in the operation which is usually fraught with difficulties and dangers. Also when the corneal section comes to be made the iris does not contract so readily, and there is less interference with the extrusion of the lens. It has the further advantage that one can tell in advance of the section just how large this needs to be. If the cut in the capsule is practically invisible, a large nucleus is present. If semigelatinous matter exudes, it is smaller, and if a milky liquid it is smaller still. It is an extremely difficult, if not impossible, task to estimate, with any degree of accuracy, from ophthalmoscopic examination alone, just what is the condition of cortex and nucleus in a cataractous lens, mature or immature. Preliminary capsulotomy reveals the matter and puts us on our guard in some cases. If gelatinous matter exudes we have a soft cortex and probably adherent lens fibers. This is true even if the opacity extends clear up to the anterior capsule and where we would be led to expect, *a priori*, a clean exit of the lens. With an ordinary capsulotomy this means a mushy extraction and much lens matter left in the eye. Even if no operative accident occurs and a nice clear black pupil is secured, the appearance of the eye at the first dressing tells the lamentable tale. Here comes in the advantage of the six-hour interval before the extraction. The action of the aqueous separates the adherent cortical fibers from the capsule, and a clean extraction follows. It is truly marvelous how little pressure is needed to deliver the lens; often it follows the knife on completion of the section. Several operators have written me that this unexpected result was somewhat embarrassing, but it need not be so if it is anticipated. In operating on a morgagnian cataract by the usual method difficulties arise because, on essaying the capsulotomy, the instant the point of the instrument penetrates the capsule the liquid cortex escapes through the puncture, and before this can be extended to an incision, the sac collapses, recedes from the instrument, no further opening is made and there remains in the eye the nucleus in its capsular envelope with an aperture therein too small to admit of its exit. Nothing safely can be done in the way of a more extensive capsular laceration, as the collapsed sac recedes from the point of the cystotome. There is a relaxed zonula, no traction on the capsule, and there remains for further instrumentation only that with the sharp hook or the Daviel spoon. It is not necessary to dwell on the operative difficulties which must then be faced or the dangers to the integrity of the eye. With a preliminary capsulotomy the fluid cortex simply mingles with the aqueous, the sac does not collapse or recede, there is no difficulty in making an ample opening, and at leisure we may observe the size of the nucleus and proportion the extent of the corneal incision for its easy exit. The section may then be made with the angular keratome, and at once if it is so desired. There is no advantage to be gained by waiting in morgagnian cataract, for there is no longer cortex to be dealt with. An operative point is here apropos for such cases and for those in which a primary capsule rupture is to be made instead of the usual capsulotomy. It occasionally happens that sufficient aqueous escapes through the corneal puncture to make the anterior chamber so shallow that section would be difficult. In this event, the tip of the McKeown irrigator is applied to the corneal opening and the anterior chamber filled out with normal salt solution. The operation may then proceed as though this incident had not occurred. It does not need any argument to prove that the smaller the corneal section consistent with an easy exit of the lens, the better are the patient's chances against infection and for an uninterrupted healing of the wound, to say nothing of the larger probability of the surgeon making this in a single plane and with greater facility.

It is conceded that operative difficulties and postoperative dangers attend the removal of a cataractous lens in which there is still much transparent cortex; also, it is certain that a method which would minimize these dangers would be of inestimable value to both surgeon and patient. It is also true that it would be better still if all media could be removed which are opaque or which might become so, provided always that in so doing no greater risks, immediate or remote, are incurred. Given a case in which, from advancing opacity in the lens, there results diminished visual acuity, industrial incapacity and mental distress, several courses are open to us. We may advise, as was formerly the almost universal rule, that the patient wait until complete opacification occurs and the cataract becomes operable. This meant for the sufferer more mental distress, a gradually lessened earning capacity, perhaps even poverty and the loss of all the pleasures of life which are dependent on good vision. To make matters worse, there was the haunting element of uncertainty, for no man could say how long might be the weary waiting, or whether after years of groping in semidarkness, even then operable maturity would result. The second course open would be an extraction after the usual method, with all its attendant dangers, operative and postoperative, and the rather small chance of a final good visual result. The third choice would be artificial induction of operable maturity by Förster's, McKeown's or some other method; the fourth, extraction in the capsule, and the last, safe and speedy extraction by my own method.

It is in the hope that the first shall be last and the last shall be first of these several choices, that this paper is presented for your consideration.

Against the second course the profession is practically united, although it is true that in highly skilled hands, with irrigation to remove cortical débris, with preliminary iridectomy and subsequent needling, a fair proportion of successes may be attained; but no one will deny that the risks are greater, the convalescence more prolonged and the final visual results poorer than would be the case in mature, operable and fully opaque cataract.

The third course is artificial maturation; operations intended for this purpose have not attained success and have fallen into disuse. None of the methods used seem to produce any uniform or decided effect. Puncture of the capsule advised by von Graefe in 1864 and reintroduced by Correnti in 1872 fails for the reason that *punctures* in the capsule do not gape, and there are formed (if any effect is produced) simply insulae of opacity just beneath them and no separation between capsule and cortex. McKeown injected fluid under the lens-capsule. This procedure, though successful, was difficult and dangerous. Does it not seem more rational to bare the lens of its capsule and let the fluids of the eye itself do this effective work?

The fourth course we might follow is extraction in the capsule: against this much must be said. If it could be done with the same proportion of immediate or ultimate successes or with no greater operative risks, this method would be ideal, for it removes in one step every impediment to the clear passage of light into the eye. Unfortunately, the operative risks are appalling and only in hands especially trained under personal tutelage of its one able exponent are these, even then, brought within reasonable comparison of the time-tried classic methods. Barring operative accidents, the immediate results are brilliant; but there are the later ones to be considered. The updrawn pupil (in spite of the large iridectomy) which is later present in these cases points to a dislocation of the vitreous, and I am credibly informed by surgeons of the highest authority in India that there is a slow degenerative change which takes place in these eyes and ultimately leads to much loss of vision. On theoretical grounds the procedure is harsh and unsurgical. To use force sufficient to rupture the zonula, applied from behind (for the resultant force must come from this direction) even if there results no loss of vitreous, is in my opinion a damaging traumatism and a menace to the future integrity of the eye. I have done successful extractions in the capsule, but they were operative mistakes following an insufficient capsulotomy by the usual method. In skilled hands it might possibly be the operation of choice where there was a deep anterior chamber and a tremulous iris, for here one has a weakened zonula; but as a routine measure or for the occasional operator it has my unqualified disapproval. I have had no experience with the manner of separating the lens from its zonular attachment by any of these four methods, namely, suction, traction, lateral pressure or rotation in the patellar fossa; of these the latter appeals to me as more likely to attain the desired result with a minimum of traumatism.

This reviews other methods of dealing with immature cataracts; in my own the capsule is opened by as large a crucial incision as it is possible to make, done as a preliminary measure six hours before the extraction proper. In my own experience, confirmed by that of others, this is sufficient to produce almost invariably a complete separation between capsule and cortex, to make operable cataracts in any stage of maturity leading up to a clean extraction and rarely leaving cortex behind. It has long been my conviction that the extraction of the clear lens in high myopia was feasible by this method, but I had no opportunity to test this personally. In six of the cases analyzed later in this paper it was carried out and all were successful. One could put the procedure to no greater test than this, for surely, if it led up to a facile extraction in these cases, it should not fail if the lens is becoming opaque. No originality is claimed for the preliminary capsulotomy, and whatever merit the method may possess lies in the technic, which is original, and the discovery that immature cataracts may be rendered safely operable in a few hours. If the capsule is inelastic and held taut by the insertion into it of the reefing lines of the zonula, it follows that in proportion as the incision into this is nearer the point of insertion of these lines, the greater will be the retraction; and the more nearly this incision approaches in form an equal-armed cross, the more perfectly will the capsule retract from the lens

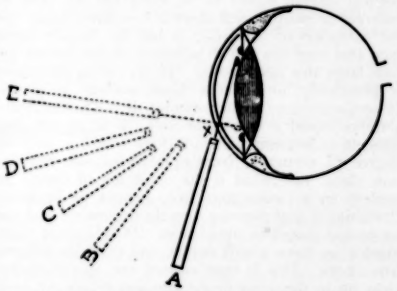

Fig. 2.—Operator standing at patient's head. First plane. Section through right eye on a plane parallel to the long axis of the body. The blade piercing the cornea at *x* is passed down to the lower margin of the dilated pupil and brought successively through positions *B*, *C*, *D* and *E*, thereby effecting a long vertical cut in the lens capsule.

surface, leaving it open to the imbibition of aqueous. Assuming this to be true, it follows that the technic which will insure this large opening is a matter of importance.

It is a matter of difficulty to convey clearly in words such a description of even the simplest operative procedure that he who reads may run—and do it in like fashion. This has been brought home to me by much correspondence from those to whom my previous descriptions were not clear. To this I have appended illustrations which I trust may help to clarify whatever may be lacking in the written word.

In the first place, the shape of the knife is important if one is to make with it the necessary excursions in the anterior chamber and not get into trouble. The blade length should be 2 mm., the belly rounded, the point obtusely ground and the whole acutely sharp from end to end, for heel, belly and point must successively come into use as the cut progresses.

The pupil having been fully dilated by a 2 per cent. solution of homatropin, the proper preparations of

asepsis and cocainization carried out and the speculum inserted, the operator, if for the right eye, takes his place at the head of the patient. Taking a large grasp with the fixation-forceps over the insertion of the internal rectus, with the little and ring fingers resting on the patient's temple, the capsulotomy knife, held as a pen with the cutting edge of the blade downward, is thrust through the middle of the supertemporal quadrant of the cornea, pushed away from the operator through the anterior chamber until the blade reaches the lowest possible point of the dilated pupil and rests on the vertical meridian of the lens; the handle is now raised until the blade penetrates the capsule; the handle is then made to describe an arc of a circle away from the operator, the blade cutting the capsule along the vertical meridian of the lens. To avoid sinking deeply into the lens or producing a dislocation, the shank is gradually withdrawn in describing the arc until at the termination of the cut

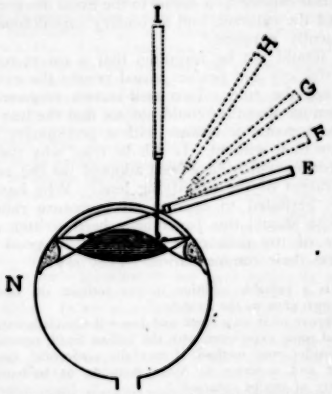

Fig. 3.—Operator standing at patient's head. Second plane. Section through right eye on a plane at right angles to long axis of body. The blade withdrawn from position at *E* (first plane) is passed to the nasal side (*N*) of the dilated pupil and brought successively through positions *F*, *G*, *H* and *I*, thereby effecting a long cut in the lens capsule at right angles to the first incision.

little more than the blade remains within the eye. The point is now released, the handle brought into its original position, the shank reintroduced and the blade carried over to the margin of the pupil nasalward and onto the horizontal meridian of the lens; the handle is now given a quarter turn toward the operator, thus bringing the cutting surface of the blade against the capsule. Again is the handle made to describe the arc of a circle, this time nasalward, the blade being kept on the horizontal meridian of the lens and the shank gradually withdrawn as the cut approaches completion. The blade is then brought into its original plane of entrance (to avoid enlarging the corneal wound) and withdrawn from the eye. If for the left eye, the operator stands at his patient's left, the corneal entrance is in the tempero-inferior quadrant and the first cut in the capsule begins above on the vertical meridian of the lens, ending below. Otherwise, the technic is the same. The speculum is now removed, a drop of physostigmin (eserin) solution, 1½ grains to the ounce, is dropped into the eye and an antiseptic dressing is applied.

It is evident that on the spherical curve of the lens surface the cut begins with the heel of the blade, is continued with the belly and ends with the point—hence the shape of the blade and the need for cutting sharpness all along its length. That the blade be short is necessary if the proper maneuvers in the anterior chamber are to be made without enlarging the corneal wound, without dislocating the lens, without having loss of aqueous, without cutting too deeply into the lens substance; it is necessary also to success in making the largest possible capsulotomy.

With the ordinary knife-needle, to escape these dangers, only a small crucial capsulotomy is possible. If aqueous is lost while the vertical cut is being made, the transverse one is impossible. If my assumptions of the mechanism of the rapid operability of immature cataracts and the retraction of the capsule be true, then it is essential that the technic here set forth be accurately followed.

Six hours after the capsulotomy the extraction proper is undertaken. I had formerly advised a twenty-four-hour interval, but I fear that this was more from motives of convenience than of necessity. Moreover I could not see that the lens came out any easier in this than in the lesser interval. On two occasions, with the longer waiting, high tension was a complicating factor in the extraction. This has occurred also in the shorter period to other operators, but, while introducing difficulties, has not resulted disastrously, as the extraction has checked the process. Occasionally, some circumcorneal injection was manifest when the dressings were taken off for the second operation. In these cases, to insure proper anesthesia, the cocain was preceded by a drop of 1 : 1,000 epinephrin solution. The extraction proper is done after the usual method, but the operator now knows just how large a corneal section is necessary. If there has been no escape of semigelatinous lens matter from the capsular cut, then the section should comprise the upper two-fifths of the cornea, as the nuclei of immature cataracts are usually large.

Each operator may elect whether or not he shall make a conjunctival flap. My own preference is for this and a large one. Here, again, is another advantage in preliminary capsulotomy. The flap turned down over the cornea, when an ordinary capsulotomy is next to be done, obscures the operative field. When this has been done, the disposition of the flap is no embarrassment.

The matter of simple versus combined extraction is too complex to admit of review in this place. My own choice is for the former, provided the iris is mobile and dilatable. The cosmetic results are better, and there is no risk of adhesions between cut iris surfaces and tags of capsular membrane. With preliminary capsulotomy there is practically never cortical débris to be reckoned with, and the risk of iris prolapse is minimized by the immediate use of atropin following the toilet of the wound. There are surgeons, however, who prefer the combined extraction as a routine procedure. There is much to be said in its favor, and for the occasional operator who has not the facilities of special hospitals or trained ophthalmic nursing it is perhaps the safer method. That the contentions embodied in this thesis might carry greater weight than would my own unsupported asser-

tions, letters were sent out to members of this Section, whose replies are tabulated here.

RESULTS OF OPERATIONS ON IMMATURE CATARACTS FOLLOWING PRELIMINARY CAPSULOTOMY

	No.	Per Cent.
Total number	180	..
Of these there were successful	164	91
Total failures	5	3
Partial failures	11	6

There were thirty-nine operators who reported cases; of these several reported only one case each. Taking into account unfamiliarity with a new procedure at the hands of many men, and comparing the statistics of results in fully mature and operable cataracts with the percentages here given, in what is admittedly a more difficult and dangerous operation, it will be seen that this method does not suffer by comparison. An analysis of the causes for partial and total failures would make the comparison still better, for of the total failures one had nothing to do with the operation, and the partial failures were tabulated as such irrespective of the final visual results. Of the five total failures, one was due to intra-ocular hemorrhage some days after a successful extraction, with no ascertainable cause; one was due to vitreous prolapse, the nucleus being left in the eye, which was subsequently lost by plastic iridocyclitis; one was due to plastic iritis; the pupil closed in and two cystotomies later failed to keep it open. For the remaining two no cause was given. Of the partial failures eight were due to lens matter left in the eye; in one case the operator failed in technic only, the final visual result being good. No cause was given in two cases. Final results were good in three cases, and not reported in eight. Of operative accidents only three are reported; in two the lens was dislocated, and in the third partially so. There were twelve cases reported of postoperative complications; six of these were iridic inflammations, six of high tension; but while these introduced an embarrassing feature, none resulted disastrously. The intervals between capsulotomy and the extraction varied between six hours and ten days, the largest number being twenty-four hours.

Against the many advantages of a preliminary capsulotomy, irrespective of the maturative process on the partially opaque lens, I advanced the objection that the operation requires more time and trouble, as the technic of asepsis must twice be gone over. Dr. Fridenberg says, "We cannot, however, dismiss all objections in a single sentence unless we close our eyes to the fact that it is the danger of infection even more than the time and trouble of disinfection in a second operation to which we hesitate to expose our patient and which we would not risk unless there was something definite to be gained." I am not aware what is the percentage of infection under modern asepticism in ordinary cataract extractions; but whatever this may be, it cannot be smaller than in the series of 180 cases here detailed, for in this it was zero, there occurring no operative infections at all. This objection therefore *can* be dismissed in a single sentence. Compared with capsulectomy, it is an easier, more effective and a more surgical procedure, not to mention that capsulectomy sacrifices the advantage of knowing in advance how large a section one needs to make. It cannot be combined with capsulectomy if properly performed, nor is there need of this, for there remains no capsule in the pupillary space. In the circular letter sent out criticism was invited. The most serious objection was that high tension followed. This occurred in 3 per cent. of the operations. In such cases it is better not to use a speculum but to employ Angelucci's fixation. Also, the section should end with extreme gentleness, as the lens will almost invariably come out with its completion. The next objection in point of importance was retention of lens matter at the time of extraction. This occurred in less than 5 per cent. of the cases. This, too, compares favorably with the percentage of the same mishap in apparently fully mature lens extractions. It usually can be successfully met by irrigations with McKeown's instrument, using normal salt solution; failing the accomplishment by this, needling should give better vision. There are cases which will always require this, for, quoting Risley, "In this class of cases there is usually some involvement of the posterior capsule as a sequel to the uveal disease which caused the cataract, and secondary capsulotomies are frequently required."

It should not be forgotten that a cataractous eye is a sick eye and perfect visual results the exception and not the rule. Two well-known surgeons have written me that they could not see that the lens comes out any easier or cleaner with a preliminary capsulotomy than without. If this be true, why the many procedures which have been adopted for the artificial maturation of the opacifying lens? Why have surgeons hesitated to operate on immature cataracts? Or why should this paper have been written at all? Many of my colleagues have been so good as to express their commendation. They say:

"It is a valuable addition to our technic, the best since McKeown gave us the irrigator."

"Approve of it very much and favor it especially after having had some experience with the Indian Smith operation."

"Consider your method, if carefully performed, devoid of danger and superior to other methods of hastening the maturity of unripe cataracts."

"The intracapsular operation is still the thing we most desire, but if the capsule of the lens is to be left within the eye, there is no operation which compares with yours."

"Believe this is one of the best, if not the very best, operation for immature cataracts."

"Have found the procedure very satisfactory."

"A safer operation than extraction in the capsule."

"Think it good practice and expect to use it more."

"Believe it to be superior to Förster's."

"I am much impressed with the great value of your procedure. For immature cataract, especially in subjects under 55 years of age, in conjunction with irrigation of the anterior chamber it appeals to me to be unexcelled."

These opinions, selected from many others equally commendatory, are from men eminent in the profession and known to all of you.

In conclusion, I wish again to emphasize the advantages of a preliminary capsulotomy as against capsulectomy or that immediately preceding the delivery of the lens. When properly performed and an interval of six hours allowed to elapse between this and the extraction proper, a separation between capsule and cortex will result and so make immediately operable cataracts in any state of opacification; and the delivery of the lens, mature or immature, is cleaner and easier than by any other method.

ABSTRACT OF DISCUSSION

DR. S. D. RISLEY, Philadelphia: I have been able to demonstrate to my own satisfaction the signal value of preliminary capsulotomy in the several varieties of immature cataract, but have not employed it, as Dr. Smith suggests, as a preliminary step in the extraction of fully opaque lenses. In the extraction of mature cataract I have not experienced the difficulty and danger he describes in performing capsulotomy after the corneoscleral section has been made. The procedure, however, in lamellar cataract, extraction of the lens in high myopia and the amber-colored and posterior polar or capsular cataracts, has proved valuable. In the opaque, milky lenses of the morgagnian type, I doubt its expediency unless the remaining nucleus is extracted immediately. I have been led to fear the deleterious influence of the contents of the capsule of a fluid cataract on the health of the eye if allowed to escape into the anterior chamber and remain there. The eye is liable to ciliary injection, pain and a low form of iritis or iridocyclitis with a tendency to increased tension.

A correct technic for preliminary capsulotomy is important. It is not a discission of the lens. To cut deeply into the cortex is to defeat the purpose of the operation. The second puncture of the cornea to perform the cross-section is an unfortunate detail and introduces additional danger from infection. I have, therefore, in all of my later work, made simply the vertical section of the capsule, being careful not to penetrate the lens cortex. I have used for this purpose my secondary cataract knife described some years ago, a small spear-shaped blade with a thin midrib beaten from a shaft of steel, ground and polished, which can be made very sharp. The opening made by the blade is tightly filled by the shank so that no aqueous is lost. When this blade is drawn across the capsule, it leaves at first only a dark line. This can be seen under artificial illumination to broaden into a vertical, ovoid opening in the capsule which later becomes faintly gray. In twenty-four hours this grayness has passed under the capsule. I have not found it convenient to undertake the subsequent extraction of the lens in six hours after the preliminary capsulotomy but have habitually allowed two days to intervene, unless necessity arose for earlier intervention. In my experience, no untoward results have come from this delay provided the anterior cortex of the lens has not been deeply invaded while cutting the capsule.

At my Wills Hospital Clinic I have to contend with a large percentage of complicated cataracts, that is to say, eyes with uveal disease with vitreous infiltration, irises which do not dilate well, engorged anterior ciliary vessels and opacities of the lens, or opacity of the posterior capsule, often spreading to the cortex at the pole of the lens, with or without spicules emanating from the periphery of the lens and projecting along both the anterior and posterior capsules into the pupillary area. In a considerable percentage of these eyes the lens becomes amber-colored, remains more or less transparent and the opacity does not advance. In these cases I have found the preliminary capsulotomy of advantage. I have not been so fortunate as Dr. Smith seems to have been in extracting these lenses without the necessity for secondary operations. I have been compelled in certain cases to resort to secondary capsulotomy to secure a clear pupil. The procedure is of signal advantage in the extraction of the transparent lens in high myopia and in the lamellar cataracts of childhood. I am convinced that in the entire group of cases which I have designated as complicated cataracts, the preliminary capsulotomy affords better results than can usually be obtained by extraction by our more usual methods.

DR. HIRAM WOODS, Baltimore, Md.: I have to relate my experience with three cases of the Homer Smith operation. The first patient was a man with double cataract. He was a railroad man, aged 43, whose central vision was reduced to about 3/200 from nuclear cataracts. He was unable to work. I had read Smith's communication. I obtained his knife, and in my first case did a preliminary capsulotomy on one eye, in the afternoon, Jan. 7, 1913. The capsulotomy was done with the incisions described by Smith. I did not see the patient again until the next afternoon; but at about 10 a. m. that morning I had a message from the nurse at the hospital that the man had a great deal of pain and nausea. In the afternoon I found T+ with the fingers. It was not measured with the tonometer. I made an immediate extraction of the lens. The appearance of the lens had not been changed, but the iris was distinctly bulging forward. The only complication was a rather profuse hemorrhage with the iridectomy. The patient recovered without further incident. The pupil was entirely clear of any remnants of soft substance, and he obtained 20/20 vision in that eye. Two weeks later, preliminary capsulotomy was done on the other eye at 8 a. m. Early in the afternoon, the cataract was removed with an iridectomy. I followed Smith's directions accurately, allowing six or seven hours between the two operations. There was no reaction and no soft substance. When I last saw the patient, he had normal vision in both eyes. The third case was that of a man aged 40, who had lost one eye from a cataract operation in another city, and I wanted to give him every possible chance. He had an opalescent cataract, V.=20/200. I did a preliminary iridectomy Jan. 16, 1913, and waited till February 13, and then did a preliminary capsulotomy in the morning, intending to extract the lens in the afternoon. He felt unwell in the afternoon, but the eye was quiet. He grew worse and apparently had an attack of grip. I had to wait nine days, to February 22, before I could remove the cataract. The eye showed no irritation during this time, and when extraction was done, the lens came away readily, leaving a clear pupil. He obtained almost 20/20 vision. These cases bore out Smith's contention that this operation brings away the entire lens. I want to compare these cases with another operated on recently. A woman with an old central choroiditis wanted an immature, nuclear and probably secondary cataract removed. Owing to circumstances, which I could not control, she did not come in time for a preliminary capsulotomy and I extracted the partially clear lens without the preliminary capsulotomy. I had done a preliminary iridectomy two months before. In this case, there was a lot of soft lens substance which had to be removed by irrigation. The patient did well, but had only 20/80 vision from 20/200.

These cases seem to bear out Smith's statement that preliminary capsulotomy is efficacious in separating soft cortical substance from the capsule, and making it adhere to the lens. In the first three cases I had no cortical matter to deal with. In the case in which the preliminary capsulotomy was not done, there was considerable soft lens substance.

DR. ALLEN GREENWOOD, Boston: I have operated in two of these cases of high myopia with nuclear cataract, and have made, instead of the two punctures, a V-shaped incision with a knife recommended two years ago by Dr. Fridenberg. This can be done without the loss of aqueous, and I can testify to the ease with which the lens can be pressed out after this preliminary capsulotomy. It is my custom to do the preliminary capsulotomy late in the afternoon of one day and to operate the next morning, having an irrigating apparatus ready to use if necessary.

DR. W. E. LAMBERT, New York: I have had some experience with the Smith method in cases of high myopia. It is my custom, however, in such cases, to do the ordinary discission, especially in young people. I operated on a woman over 50, with high myopia and immature cataracts, the nuclei apparently rather large. I did a preliminary iridectomy in both eyes and felt justified subsequently in doing a simple extraction in one eye. The result was most satisfactory; but there was so much soft matter remaining that I did a preliminary capsulotomy on the second eye. A peculiar and alarming complication arose. I have never extracted the lens as soon as six hours after the capsulotomy, but usually twenty-four hours—frequently, in cases of myopia, much later. In the case referred to, forty-eight hours elapsed and the lens being somewhat swollen, it seemed advisable to make the extraction; a smear, however,

showed a mild infection, and Dr. Dixon, our pathologist, advised waiting. I did wait fortunately, and the next morning the patient had an acute mucopurulent conjunctivitis, tension plus, and circumcorneal injection. I used a 1/20 grain of silver nitrate irrigation. At the end of three days the acute catarrhal conjunctivitis had subsided and I extracted the lens. It came out nicely, with less soft lens matter than in the first case. The patient made an excellent recovery. I think the procedure is useful in high myopia, especially in older people.

DR. M. FEINGOLD, New Orleans: I have performed Dr. Smith's operation in about twelve cases, but I had to deviate from the practice advocated by Dr. Smith as to the time of the second operation, for the reason given by Dr. Risley. Another, a theoretical, reason occurred to me for which we should delay the second operation. We all know that bandaging a comparatively sterile eye after it has been handled with any kind of cleaning material such as soap, mercuric chloride or otherwise, may bring about a low-grade conjunctivitis, which, when the wound is closed, is in no way endangering the good result; but should we attempt to opegate on the eye during this conjunctivitis, if in any degree purulent, we might run the risk of producing an infection. For that reason I concluded it would be better to make the incision, wait until removal of the bandages, and then to allow the eye to become normal again and in forty-eight hours or later perform the second operation, provided no important indication for delay has occurred. It is interesting that Dr. Lambert's case brought out one of the possibilities which I had determined theoretically. Another reason for delay which occurred to me is that we might make the primary incision with an instrument that has a little thicker shaft and when we attempt the second operation six hours later, we might get emptying of the anterior chamber before we have entered with the knife, should the patient behave badly, squeeze the eye, etc. For these reasons, especially as infection is so important I thought it worth while to delay the secondary operation, and I have delayed as long as ten days, with no untoward symptoms. As to the point of secondary operations, three or four weeks ago I was compelled to perform a secondary discission following one of these operations.

DR. OTIS ORENDORFF, Canon City, Colo.: Nowadays we seldom have infection after cataract extraction, and those who do the preliminary iridectomy will have few cases of infection, so that it can be almost disregarded. Delaying this operation for several days or weeks or months is a disadvantage, for the patient has to go into the hospital twice, which a good many of them will not like to do; and it is not necessary. I have not used Dr. Smith's knife, but the knife Dr. Risley speaks of. I have tried the operation for morgagnian cataract and am not pleased with it, because the contents of the lens are let out into the aqueous instead of the aqueous into the lens capsule, which is the object of the operation. Formerly, with a patient in middle life with a diagnosis and prognosis of immature cataract, the inevitable waiting, the industrial incapacity and mental distress was much like a sentence of death and victims became depressed, run down and assumed serious physical as well as mental condition. This is now entirely changed, for preliminary capsulotomy brings these cases into the category of the most hopeful of the deeper diseases of the eye. There is not only the hope of good vision, but it is not now necessary to wait for the ripening of the cataract. I have had a few cases attended with more or less success. One especially shows the typical mental aspect in many of these cases and the encouraging result. A railroad mechanic, healthy except for extreme nervousness, who had lost one eye by accident in infancy, had a slowly advancing cataract in the other eye which compelled him to abandon his former more lucrative positions. Oculists whom he consulted advised further delay, but he declared this meant insanity or worse. He could still count fingers at 10 feet and a fairly good view of the fundus could be had. The patient refused to wait further. A crucial incision in the capsule was made with the needle knife and to my astonishment the lens followed the knife out of the wound. One year later vision was 15/10 plus with 9 plus 2, axis 165. He has been on the pay-roll ten months, a contented man. My records show a number of slowly developing cataracts in comparatively young people who have only one eye, and a preponderance of cataracts occur in one-eyed people, due probably to the excessive use of the remaining eye. Persons with immature cataract compose a large percentage of our patients, and if this operation will afford them early relief it behooves us to recognize it.

DR. JOHN GREEN, JR., St. Louis: That six hours may be an insufficient interval between preliminary capsulotomy and extraction to permit of efficient separation of the capsule is indicated by a recent experience. My patient, aged 65, had immature nuclear cataract. A capsulotomy according to Smith was done at 8 a. m. There was moderate gaping of the cut, with extrusion of a little gelatinous cortex. Eight hours later combined extraction was made. A large nucleus accompanied by much sticky cortex was with difficulty extracted. Immediately following the delivery of the lens vitreous appeared in the wound, so that contemplated irrigation had to be abandoned. The ultimate result was fair —vision 6/10.

DR. W. M. SWEET, Philadelphia: Although I have not performed many preliminary capsulotomies according to Dr. Smith's method, I have had an opportunity of noting the effect of the operation in the twenty-five or thirty cases operated on by Dr. H. F. Hansell. In the earlier cases either the Knapp or Ziegler knife-needle was employed, but later the special knife devised by Dr. Smith was used, made by Tieman. Owing to the somewhat faulty construction of the knife, the blade being much wider than the circumference of the shank, the aqueous escaped after the first incision in the capsule, so that the second cut was made with difficulty. In all the cases the extraction was done twenty-four hours following the capsulotomy, as it was difficult in the hospital cases to arrange to operate six hours later. I was especially impressed in these cases by the different behavior of the cataracts even when the incision in the capsule appeared to be of the same extent. In the majority there was only moderate increase in the opacity and in the swelling of the lens. In a few there was a decided reaction. Even with the preliminary capsulotomy, many of the cases showed retained cortex in the pupillary space that required the use of the irrigator. Whether we operate in unripe cataract by the Homer Smith procedure or by preliminary iridectomy, I believe that many cases of retained cortex in the pupil are the result of an inadequate incision at the time of the final extraction, the angles of an incision wiping off portions of the cortex and leaving it in the anterior chamber.

DR. F. C. TODD, Minneapolis: The operation has been generally accepted as a distinct advance in this class of cases. I cannot agree with Dr. Feingold that we should wait some days before proceeding with the extraction. It seems to me it is better to operate within a few hours than to wait for reaction. One point was brought to my attention by Colonel Elliot, who was enthusiastic as to the operation—the wisdom of operating in the morning instead of the afternoon as suggested by Dr. Smith, in that glaucoma might occur within the first few hours and there would be opportunity for extraction early during the daytime. I have, therefore, in more recent cases, operated in the morning and done the extraction in the afternoon. There is one more advantage in this operation that has not been mentioned. It is evident that one cannot always make a diagnosis of an immature cataract. I am sure others make this mistake. I have extracted not a few lenses that were entirely hard, that has been postponed because of supposed immaturity by other oculists. This operation enables us to diagnose the consistency of the lens, it is an "exploratory incision," and if we find we have made a mistake and the lens is hard we can extract at once after making the capsulotomy.

DR. M. BLACK, Denver: Is the knife made right?

DR. HOMER SMITH, Norwich, N. Y.: It is a great pity that those who make the instrument do not have to use it. The

blade should be beaten from the shank. The belly of the blade should be acutely sharp so that each portion will come in contact with the incision. If not acutely sharp you will lose vitreous. Each knife should be tested out on a drum to see that the cutting edge of the blade is sharp clear up to the point. On account of lack of this some accidents have occurred. Tiemann makes the best knife. Dr. Risley takes up the point of preliminary capsulotomy as a routine measure in acute cataracts. It is universally adopted in England. In my paper the matter of the immediate extraction of morgagnian cataract is taken up, and I do not allow the six-hour interval because there is no cortex to deal with. If there is loss of aqueous at the time of the capsulotomy there is no trouble following, because the anterior chamber can be refilled by an irrigator with normal salt solution and you can go on with the extraction immediately without further waiting. In all the cases reported, 180, there were no infections whatever, so that matter is a negligible factor. But high tension is another matter. In a number of cases there will be high tension, and the longer the interval between the preliminary capsulotomy and the extraction proper the greater the risks of high tension. The high tension cases require some variation in the technic. A speculum should not be used, but fixation. If the anterior chamber is shallow, then you have three operative courses: The incision can be begun by and continued with the scissors curved on the flat. If the anterior chamber is almost completely obliterated, the section can be made from the outside with a broad-bladed scalpel through the sclerocorneal junction. I have seen that done at Moorfields repeatedly. The scissors may be applied in that case also. In all high tension cases the section can be made full size in the ordinary way, but should be completed with the utmost gentleness on account of the risk to the vitreous. I said in my paper that secondary operations are rare; I did not say they are never required. There is a small percentage of cases in which it does not work.

ACTIVE IMMUNIZATION IN DIPHTHERIA AND TREATMENT BY TOXIN-ANTITOXIN*

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AND
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The property of toxin-antitoxin mixtures to produce immunity in animals has long been known. One of us (W. H. P.) published a series of successful results in 1903. Smith suggested the attempt to immunize children, but no one undertook it until 1912, when von Behring made the attempt.

In May, 1913, Behring published the results obtained in human beings. The combined substances were either neutral or slightly toxic to the guinea-pig. Individuals were injected with small doses (from 1/20 to 1/10 c.c.) which were repeated in from seven to ten days. The first injections were made subcutaneously or intramuscularly, while later the intracutaneous administration was favored, since the more distinct local reaction was believed to induce a greater efficiency of vaccination.

The results as reported from different observers have not been uniform and as a rule are not distinctly stated. Hahn reports antitoxin production in thirty-six out of forty treated; as we shall see later, the fact that twenty-five of the forty patients had natural antitoxin already present modifies greatly the favorable nature of this result. Failure to respond was at first attributed to a lowered general condition but now we realize that it was because the susceptibility to the immunizing response to vaccine varies. It seems greatest in young adults. Zangmeister reports the interesting fact that the new-born are nearly a hundred times less susceptible to vaccine than adults. Kleinschmidt and Viereck report the active immunization of twenty-seven cases, but give no definite data. They advise combined active and passive immunization in persons exposed to diphtheria and also suggest the use of the Schick reaction in determining antitoxin content of persons after vaccination. Kissling reports results at Hamburg-Eppendorf in the immunization of 310 patients who were exposed to infection. In the 111 who were injected twice, no diphtheria developed. In the 109 cases injected once, 8 patients developed clinical diphtheria. During an epidemic of diphtheria, Hahn and Sommer vaccinated part of the inhabitants of several villages: of 633 patients considered fully immunized only two developed mild diphtheria, but 10 of the group developed it during the first ten days. The disease continued to spread to some extent among those not vaccinated. Bauer finds that the persistence of the bacilli in carriers is not shortened by active immunization. He believes that not only all patients with antitoxin, but also those without natural antitoxin can be immunized, if sufficient doses and amounts of vaccine are injected.

The interval between the injections of vaccine and development of antitoxin varies in different cases. According to Hahn it is usually not less than three weeks. Kleinschmidt and Viereck found it shorter—even eight days. Patients with natural antitoxin usually show early and considerable antitoxin production. They also generally show a somewhat greater local susceptibility to vaccines. This according to von Behring is due to sensitization from previous infections with the Klebs-Loeffler bacillus.

According to von Behring, the higher temperature of fever will destroy antitoxin at an increased rate so that an amount of antitoxin, which generally protects, fails to do so in measles and scarlet fever. Schick and Karasawa find, however, that no change in antitoxin content is caused by measles. Von Behring considers that 0.01 unit per cubic centimeter is sufficient to protect healthy persons. Much less than this probably suffices except under unusual conditions, as in scarlet fever.

PERSONAL EXPERIENCE

During the past twelve months the attempt has been made to immunize actively against diphtheria the patients in the scarlet fever wards of the Willard Parker Hospital. Owing to the large number of diphtheria-carriers admitted, the conditions in this hospital during the winter were such that on the average about one-quarter of the inmates were diphtheria-carriers.

For this purpose mixtures of diphtheria toxin and antitoxin were prepared, either slightly antitoxic, neutral or slightly toxic to the guinea-pig. A strong diphtheria toxin was used, where the minimum lethal dose was 0.0023 c.c. and L+ dose 0.27 c.c. The mixtures represented B 50 per cent., A 66 per cent., G 66 per cent., F 80 per cent. and E 90 per cent. L+ toxin to each unit of antitoxin. The L+ dose of toxin is

* From the Research Laboratory of the Department of Health.
* Read before the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

the amount which, when mixed with 1 unit of antitoxin and injected into a 250-gm. guinea-pig, will cause its death at the end of four days. One c.c. of Mixture E caused when injected into a guinea-pig at first a slight local induration and then in about twenty-days paralysis.

The injections were made subcutaneously or intramuscularly in doses of from 0.25 to 1 c.c. of undiluted vaccine; a few of the non-immune persons received as high as from 3 to 5 c.c. at each injection. The dose was repeated two or three times at intervals of from three to seven days. The injections were made posteriorly in the intrascapular region, in some over the insertion of the deltoid.

The local reactions consisted as a rule of varying degrees of redness, induration, pain and tenderness; in part they seemed to depend on the size of the dose and in part on the individual susceptibility. Persons with natural antitoxin gave somewhat more frequently the stronger local reactions. The constitutional symptoms were as a rule rather mild; occasional temperature reactions of from 1 to 3 degrees were noted after larger doses of Mixture E.

The results of the active immunization were controlled by determining the antitoxin content before the injection; again three weeks and more after the injections similar examinations were made. The antitoxin content of the serums was estimated by Römer's intracutaneous method on the guinea-pig. As it was not possible to detect less than 1.160 unit in 1 c.c. of serum, anything less than that was considered as absence of antitoxin, although naturally some serums not showing this amount may have had a slight trace.

A group of 68 patients was injected with the various vaccines; of these, 44 had, before the injections, sufficient natural antitoxin to protect them against diphtheria. They all showed a decided production of antitoxin in a relatively short time (in some as early as seven days). The remaining 24 patients had no appreciable antitoxin before the injections; of these, 6 gave rise to distinct antitoxin production while 18 failed to respond.

Five patients of the 18 which did not respond developed slight or moderate clinical diphtheria two weeks or more after the first injection. Four had tonsillar exudates and one nasal diphtheria with visible membrane in the anterior nares. Cultures were positive, and the isolated Klebs-Loeffler organizations virulent.

We thus found that persons with natural antitoxin gave a ready response to active immunization, while those with no appreciable natural antitoxin failed to do so in a considerable proportion of cases. A larger group of susceptible patients was, therefore, selected to determine these results in a greater number of cases. For this purpose the intracutaneous reaction of Schick with diluted diphtheria toxin was used. This reaction depends on the local irritant action of toxin in the absence of antitoxin. A dilution of diphtheria toxin is made of such strength that 0.1 c.c. contains 1/50 minimum lethal dose for the guinea-pig. This amount is injected intracutaneously on the flexor surface of the forearm. A positive reaction appears in from twenty-four to forty-eight hours, and is characterized by a circumscribed area of redness and slight infiltration, which remains for from seven to ten days. After fading, a brownish pigmented area is left for days and weeks which in beginning generally shows superficial scaling. According to Schick, a positive reaction indicates that there is less than 1/30 unit of antitoxin in 1 c.c. of blood. The majority have none at all. Such persons he considers susceptible to diphtheria. Our estimations agree with his conclusion.

The Schick reaction was again employed three weeks and more after the vaccination to indicate clinically whether or not the patients had responded to the immunization. In many, bleedings were taken and tested in addition before and after the injections.

Ninety persons without appreciable antitoxin were thus selected who received full immunizing doses of Vaccines E and F; of these only twenty, or 22 per cent., gave rise to a decided production of antitoxin (1/20 up to 10 units per cubic centimeter). Among the remaining seventy patients a considerable number were found in whom the Schick reaction was fainter, but not obliterated when the tests were made four or five weeks after the injections; the antitoxin produced, however, was too small in amount to be detected in the animal test. Seventeen of the seventy patients who failed to respond developed clinical diphtheria twelve days or more after the first injection of the vaccine; those who showed symptoms before twelve days were not included in the group. Twelve patients had purulent nasal discharges sometimes tinged with blood, four tonsillar exudate, and one laryngeal diphtheria. The cultures were positive, and the isolated organisms virulent.

We note that active immunization in this group of susceptible persons gave rise to decided antitoxin production in 22 per cent. of cases; the interval between vaccination and development of immunity was generally long, as a rule not less than two weeks. Under conditions of exposure about 20 per cent. of those who failed to respond have developed clinical diphtheria.

SUMMARY

Active immunization produced a very decided increase of antitoxin in a relatively short time in all persons who had natural antitoxin. These, however, were immune to diphtheria before the injections were made.

In a series of 700 scarlet fever patients of varying ages tested by us for natural immunity by the Schick reaction, 400 gave a negative reaction. Fifty-seven per cent. were, therefore, naturally protected and needed neither active nor passive immunization. Less than one quarter of the remaining 43 per cent., which were probably susceptible to diphtheria, reacted to active immunization with mixtures of diphtheria toxin and antitoxin to a degree sufficient to immunize them surely. A larger percentage developed a trace of antitoxin which was possibly enough to give a slight protection.

CONCLUSIONS

Those who are definitely exposed to infection should be passively immunized even if the toxin-antitoxin injections have been given.

The use of the Schick test will eliminate the necessity of immunizing about two-thirds of those subjected to exposure, as judging from a year's experience, those not reacting are immune.

Those found to be naturally immune probably continue immune for a considerable period of time, possibly indefinitely.

Active immunization is indicated when there is no immediate danger of infection and when it is desirable to lessen the number of susceptible persons. It is too early to decide whether active immunization should be

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attempted on a large scale. The lack of a sufficient response of at least 50 per cent. of those susceptible to diphtheria and the fact that the immunity lasts for but one or two years are drawbacks that will probably limit to some degree its usefulness.

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THE USE OF ANTITOXIN IN DIPHTHERIA *

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Conclusions as to the use of any remedy in a disease must be based, in the final analysis, on practical experience. Theory may aid us in finding the remedy and may guide us in its use, but our final judgment must be based on results alone.

Diphtheria antitoxin has been abundantly proved to be a specific for diphtheria, and a cure when used in correct doses at the proper time. With an agent at our service, known for such a length of time, of such acknowledged usefulness, and of such direct and specific action, it is surprising that there should exist even that small percentage of failures which we must constantly face. It is true that the circumstances of general practice and the possibilities of error in diagnosis offer limitations to the immediate and proper use of the serum which make the attainment of ideal results out of the question. Nevertheless, it must be apparent that it should be possible still further to reduce our mortality, reduce it to a much smaller figure than it is at present. If, therefore this result is to be achieved, we must accomplish it by a change in the method of our use of the specific for the disease — general hygiene of the patient and medication being watched always in addition.

This paper is based on personal observation of over ten thousand cases of diphtheria at the Philadelphia Hospital for Contagious Diseases. This series of cases has given me ample opportunity to observe the action of various doses of antitoxin.

The use of antitoxin in diphtheria is so eminently successful because diphtheria is primarily a local disease, exerting its harmful effects through the formation of a toxin by the organism causing the diphtheritic process. This toxin is quickly spread throughout the entire body and attacks early the nervous system, heart and kidneys, all structures of vital importance. The resistance of the body to this toxin is by the formation within of an antitoxin, and this protective action we aid by the introduction from without of an antitoxic serum.

The term "antitoxin" as used in this paper refers to the serum containing antitoxin — the diphtheria antitoxin of the United States Pharmacopeia, officially defined as "blood-serum from horses immunized against diphtheria poison." There is also in use a method for determining the amount of antitoxin in the immune serum. This method, by which the content is expressed in certain definite units, enables us to measure comparatively our doses and in this way is of great aid. But there has been devised no way of estimating the number of such units needed by a particular person suffering from diphtheria. This we can determine empirically only — not entirely by any particular symptom in a given case, but by the observation of a great number of similar cases.

Of course our dose must be determined to a great extent by the size and susceptibility of the patient, the severity and extent of the lesions, the length of time the patient has been ill and perhaps by the virulence of the disease in a particular epidemic.

I am entirely satisfied that diphtheria antitoxin as generally used is given in doses far too small. Our object should be to accomplish by its use the neutralization of all the diphtheria toxin within the body and the giving of a certain excess of antitoxin for the further use of the body in counteracting fresh toxins that may be formed at the focus of infection.

A discussion of the advisability of using larger doses of diphtheria antitoxin must cover three points:

1. Our objects in giving larger doses.
2. The benefits to be derived from such doses.
3. Possible objections to their use.

The object we have in view is the rapid and complete neutralization of the diphtheria toxin by a single dose of antitoxin, if this be possible. Most cases of diphtheria treated by present methods are given numerous doses of serum — small in comparison with those which may be used safely. In a good percentage of cases the patients recover — when finally the toxins have been balanced by repeated masses of antitoxin in addition to the antitoxin elaborated within the body. Why not make the endeavor to give at once as an initial dose such an amount of antitoxin that this neutralization will be accomplished without delay, and that possibly there will be an excess of antitoxin still in the system to combat toxins later elaborated. To give a dose too small invites disaster by causing delay in checking the disease process. To give too large a dose can do no harm and may be a safeguard for the future.

The benefits derived from so-called large doses through the rapid neutralization of toxins are threefold:

1. The patient is rapidly cured of the disease.
2. Complications are minimized.
3. The patient's recovery is hastened and the infectious period shortened.

The rapid action of even moderate doses of antitoxin is often marvelous. Far more certain, rapid and permanent are the effects of large doses. By overwhelming the toxins, recrudescences are rendered less liable to occur. Complications, with few exceptions, result directly from the action of the toxins on the vital structures — the heart, kidneys and nervous system. It must be evident at once that if we rapidly neutralize the toxins and avoid the formation of new toxins or forestall their effects, we must be lessening the probability of the occurrence of complications.

Before proceeding to a discussion of the possible harmful effects of large doses, two points should be carefully noted:

A. The location of the disease process and its extent, the virulence of the infection, the patient's general condition and the duration of the illness must all be considered in arriving at a conclusion as to what a correct dose of antitoxin is in every particular instance.

* Read before the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

B. The following indicates just what I mean by large doses, and what doses I am accustomed to give.

No case of diphtheria, however mild, should receive less than 10,000 units.

Both tonsils well covered with exudate, of one or two days' duration, from 30,000 to 60,000 units.

Both tonsils well covered with exudate, with palate, uvula and nose involved, of three days' duration or thereafter, from 150,000 to 300,000 units.

Nasal cases, simple, 20,000 units.

Nasal cases, with marked symptoms of toxemia, from 50,000 to 150,000 units.

Laryngeal cases, from 30,000 to 45,000 units.

Laryngeal, in combination with other varieties, should mean a corresponding increase in dosage.

The theoretical advantages of large doses have been stated. One practical advantage also is the avoidance of the pain and discomfort of frequently repeated doses. What are the objections which might be urged against the use of large doses?

1. Such an amount of antitoxin might prove harmful to the patient. This is disproved by actual experience. Untoward results from the use of diphtheria antitoxin have followed the use of moderate or even small doses just as often as after the use of large ones. Indeed, it has been shown that such a result is not due to the antitoxic bodies themselves, but to the serum alone. There is then a great possibility that such after-effects might be avoided entirely, certainly minimized, by the higher concentration of the antitoxin.

2. The possibility of anaphylactic shock. In my experience this is extremely rare. Its occurrence is of such great rarity that it cannot be allowed to influence us in the least. Too many lives are lost by too little antitoxin being given to allow a theoretical possibility to keep us from making a cure.

Local sloughing from the bulk of the serum is very rare and will be avoided entirely by further concentration.

My actual results show well in the accompanying table.

RESULTS IN AUTHOR'S CASES

Year	No. of Cases	Deaths	Per Cent.	Dosage
1908	1,426	127	8.55	Very small.
1909	2,153	144	6.69	First year large doses were used.
1910	1,870	120	6.42	Larger doses about as used in 1909.
1911	1,895	130	6.86	Doses smaller than in 1909 and 1910.
1912	1,676	101	6.02	Larger doses used.

The advantages of large doses are really greater than would appear from these statistics, which include deaths from all types of diphtheria.

The benefits to be derived from large doses are less apparent in the treatment of laryngeal diphtheria than in any other form of the disease. This is due to the fact that practically all cases of this variety are sent to the hospital only when far advanced and because the condition then to be combated is not a toxemia, but rather a physical one, due to the location of the membrane. We have to deal with principally a mechanical obstruction to the intake of air resulting in insufficient oxygenation. These deaths are due to asphyxia and exhaustion or to bronchopneumonia, and not to the toxemia of diphtheria.

In our tables this number of laryngeal cases always influences the death-rate. Were we able to show the results of large doses of antitoxin when the toxemia alone must be dealt with, our figures would be even more favorable.

In the septic types, aside from the great satisfaction of feeling that the doubt as to the ultimate outcome has been set aside, we have also the comforting knowledge that by the use of large doses of this specific we have brought to a minimum the chances for the development of that most dreaded of all complications, postdiphtheritic paralysis.

The occurrence of serum sickness and serum rashes is not a bar to the use of large doses. The rashes, however, are frequent, having occurred in 43.4 per cent. of 1,000 carefully analyzed cases.

Of these, 0.3 per cent. were scarlatiniform, and 1 per cent. morbilliform. In 11.2 per cent. no variety was stated, and in 30.9 per cent. the rash was urticarial. The appearance of the rash was as early as a few hours and as late as several weeks. I have never observed dangerous or alarming serum sickness, though a few of the patients have become painfully ill and remained so for as long as a week.

Since, then, there is no bar to the use of large doses, there remains but a summary of my results with their use.

These results are:

1. Prompter local cure.
2. Quicker improvement in the patient's general condition.
3. Permanence of curative action.
4. Avoidance of complications.
5. Reduction of mortality.
6. Harmlessness of large doses.

I doubt, indeed, whether we have as yet used diphtheria antitoxin in doses that give its full therapeutic efficiency.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. WILLIAM H. PARK AND SAMUEL S. WOODY

DR. LEWELLYS F. BARKER, Baltimore: While it is desirable to use enough antitoxin, it has not, in my experience, been necessary to use as large doses as Dr. Park has recommended. I should like to ask Dr. Park if he has seen diphtheria develop in a patient in whom the Schick reaction had been found to be negative? This reaction seems to me very important. Every physician in the country should know about it at once, so that the benefits of this discovery may be widely disseminated.

DR. JOHN F. ANDERSON, Washington, D. C.: Dr. Park's first statements in his summary, that those who are exposed to infection should be immunized, should be emphasized. We have been somewhat scared by anaphylaxis. I believe that anaphylactic reactions from a second injection are very rare and they need not be given much practical consideration. In diphtheria the time of injection is important. Ten thousand units is of more value when given early than 100,000 or 200,000 when given later. I believe that we usually get a full effect without the large doses of 100,000 or 200,000 units of antitoxin.

DR. J. J. KINYOUN, Washington, D. C.: Some years ago we had a number of horses which were not producing the amount of antitoxin they should and we transferred them. They were kept without immunization for four months and then used for other antiserums. In two of these horses, tested four years afterward, not having had any antitoxin during this time, the blood showed 16 units per cubic centimeter of antitoxin. The active immunization of these horses would seem to be of long duration. A careful estimate made of the cost per thousand units, just after the precipitating method was introduced, showed that it ran from 6½ to 8¼ cents.

DR. P. S. ROY, Washington, D. C.: If we use larger doses of antitoxin we must reduce the price. According to Dr. Kinyoun a $5 package costs the manufacturer 37 cents, and

if this is true then we should demand 10,000 or 15,000 units for the price we are now paying for 4,000 units.

DR. GUY L. KIEFER, Detroit: My results are based on a smaller series of cases than Dr. Woody's, some 882 cases since January, 1913. In the first six months of the treatment of these cases the minimum dose was 5,000 units; 5,000 to 10,000 units were given as an initial dose; beginning last July 10,000 units. The mortality rate up to July 1 was 8.24 per cent., and from July 1, 1913, to May 1, 1914, the death-rate was 4.1 per cent. I wish to emphasize early administration. We had no deaths in patients who received the antitoxin on or before the third day. With regard to the kind of case, the comparison between the smaller dose and the larger dose was on cases of approximately the same type.

DR. D. L. RICHARDSON, Providence, R. I.: We should give large doses early. I think that Schick's test would be of more value for the community than in an institution. In institutions the patients are more under control and diphtheria carriers can be separated. Relative to treatment, certainly, large doses should be given. In mild cases, of course, it is not necessary. I had one experience, however, which would need some explanation and in which antitoxin seemed to have a limited value. This was in a nurse who was all right at breakfast time. At noon she had two or three patches. At 5 p. m. cultures were found positive and antitoxin was administered. In all she received 150,000 units of antitoxin. In three or four days she was very ill with virulent diphtheria with edema of the neck, and later cardiac complications, etc. This case was seen early and if not so seen would no doubt have terminated fatally. With reference to early administration, we should obtain for the community what is possible in the hospital. In Boston City Hospital for fifteen years there have been many cases of diphtheria in nurses and doctors without any deaths, and if this can be done in hospitals it should be aimed at in the community.

DR. W. W. TOMPKINS, Charleston, W. Va.: How long after diphtheria has been in a house would Dr. Park lift the quarantine? If the persons in the house were given an immunizing dose, could they go out earlier than those who had not taken the immunizing dose, and are the latter a source of infection? Does Dr. Park advise the large doses sometimes given in diphtheria? Are they safe or necessary?

DR. SAMUEL S. WOODY, Philadelphia: Concerning the time of administering antitoxin, as mentioned by Dr. Anderson, it goes without saying that were we to administer the specific on the first day of the disease, and in a dose of 10,000 units, there would be no further need of antitoxin; furthermore, there would be practically no mortality. All experience bears us out in this statement. I stated in the beginning that my paper was based on personal observation alone. I have tried antitoxin in all-sized doses and in all types of the disease, and am firm in my belief that to obtain the best results we must give the serum in massive doses.

DR. WILLIAM H. PARK, New York: The Schick injection is given with a small hypodermatic syringe with a platinum point and 1/10 c.c. is injected into the skin. A raised whitish spot will be seen over the injection. It covers an area the size of a half-dollar. The injection must go into the skin and not subcutaneously, and the little raised whitish elevation must be obtained. In twenty-four hours it becomes bluish with a slight edema, passes off in forty-eight hours and gradually disappears, but leaves a pigmentation. A false reaction may be found and then a second injection must be given; this is due to the broth and probably happens in only 2 or 3 per cent. of cases. It is perfectly correct to use for four or five weeks. With regard to quarantine—the use of antitoxin does not affect the carrier at all. Carriers need not be prevented from going out. We insist on two negative cultures from the patient before the quarantine is lifted. With regard to Dr. Barker's question: No patient has developed diphtheria after a negative Schick reaction so far as I know. We feel absolutely safe in leaving a case with a negative Schick without immunization. Unquestionably, a patient may receive any amount and in twenty-four hours may develop malignant diphtheria because the process has started, but after two or three days I have found such cases to be usually of syphilis or angina or something else. Dr. Woody stated that we cannot determine by experimentation how much antitoxin is needed in a given case. We try to give enough to neutralize the toxin in the body. We give the antitoxin in amounts large enough to get it from the tissues to the blood and out again to the local tissues where the toxin is generated; it is, therefore, the speed in getting to these various points which counts. It will be found that one-half of the patients have no toxin in the blood whatever. In the local cases a greater amount will be noted so far as the tissues are concerned. I agree with Dr. Woody that only a single dose of antitoxin is required, 5,000 units in mild, 10,000 in severe and 20,000 in malignant cases. So far as the appearance of the patient goes, the single dose has given better results, and so far as the mortality goes also. Mortality has dropped, probably owing to the single large dose. The antitoxin requires two days for 1/3 to be absorbed and another two days for the other 1/3 to be absorbed, so that it seems impossible that any larger amount will do any good. After twelve hours there is little toxin in the body except possibly locally in the tissues. We have kept to the single dose for the last year and we do this by taking a blood-test before the second injection. Ten thousand units intraveneously is worth 100,000 units subcutaneously. We have in every way tested this and we find that larger doses than from 5,000 to 25,000 units make no difference. In the more toxic cases better results are obtained from the intravenous injection, but not so in the others. Forty thousand units will save any patient that 1,000,000 will. I have seen or heard reports of severe shock in a few cases in which large doses have been given, which the small doses would not have caused, but I agree with Dr. Woody that these are few. We have never had a death in our hospital from an injection of serum. I rather feel that a large primary injection coming through safely insures against fatal result from any other injection.

TREATMENT OF UNLOCALIZED INTRACRANIAL INJURIES BY DRAINAGE THROUGH A SUBTEMPORAL APPROACH*

V. P. BLAIR, A.M., M.D.
ST. LOUIS

The emergency service in the City Hospital of St. Louis gives, I believe, exceptional opportunities for the study of intracranial injuries. In the two years, 1910 and 1912 during which I was on the Visiting-Staff, I devoted my spare time to a study of them.

Of course, all cases presenting external or neurologic signs of localized head injury, that can be directly approached, are treated accordingly, but a great many suggest no special point of surgical attack, mostly cases in which the injury is at the base of the brain; these are usually generalized as fractures of the base of the skull. In very few of these is a fracture, if present, the most important lesion, the immediately grave symptoms arising from a concussion injury of the brain and its coverings.

A composite picture of such cases might be presented as follows:

The patient is unconscious or semiconscious, pulse slow, normal or rapid, respiration sometimes stertorous and with more or less disturbance of the reflexes and voluntary movements. The pupillary reflex is the one most frequently disturbed. There may or may not be bleeding from the nose, mouth or ears. Death may follow quickly or recovery may take place. In

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a running series of eighty patients not operated on it was found that 20 per cent. died in less than two hours and over 50 per cent. in the first twenty-four hours. Of the patients that survived twenty-four hours, about half lingered for several days, being restless and semiconscious; later the pulse became weak and rapid, followed by coma, very high temperature and death.

At necropsy I have never seen a bony depression that could directly account for death, but there is intradural extravasation of blood, thrombosis of some of the cerebral veins with localized softening of the brain; these changes are most marked above the tentorium. In few of these cases there is interventricular hemorrhage or evidence of deep extensive primary brain injury, for such patients die more quickly. There is, however, not infrequently actual pulpefaction of the under surfaces of the frontal and temporosphenoidal lobes. These necropsy findings are concurred with by Dr. D. L. Harris, who was for six years pathologist of the City Hospital. The general picture of the late fatalities is the one to suggest that death was due to some secondary circulatory change rather than to the primary injury. This has been designated as an encephalitis, but in very few cases is there evidence that there had been an infection.

It is characteristic of all soft tissues, after injury, to become swollen, because of an increased blood-supply and other changes which follow and which seem to be, at least in part, related to repair.

The brain is enclosed in an unyielding case which does not provide for an increase in bulk, and further, there is frequently an extravasation of blood that actually lessens its normal space. On the theory that the subsequent clinical symptoms and necropsy findings might in part be due to a lack of space and a consequent interference with circulation, a means was sought to correct this. Repeated lumbar punctures were tried but, though this brought about a clear spinal fluid, the results were not satisfactory.

It seemed to me that single or bilateral subtemporal decompression and drainage of the subdural space should be helpful for the following reasons:

The operation is easily and quickly performed, leaving the defect in the least exposed position and protected by the temporal muscle. With the finger in this opening a large part of the orbital surface of the frontal lobe, the under surface of the temporal lobe and a fair part of the convexity of the hemisphere and inner surface of the skull can be explored; clots and also pulpefied parts of the under surfaces of the temporal and frontal lobes can be withdrawn so that the drainage prevents a further accumulation of blood and rapidly clears the cerebrospinal fluid.

If a disinfectant such as hexamethylentetramin is used, the drainage of the cerebrospinal fluid insures the dissemination of the disinfectant throughout the subarachnoid spaces.

Finally, the presence of the decompression defect allows for a certain amount of expansion of brain, insuring a freer circulation and possibly accommodation to a hidden clot.

With the help of Dr. A. H. Ryan an effort was made to substantiate or disprove those suppositions by animal experimentation in the physiologic laboratory of the Washington University, with not very conclusive results. These experiments were unsatisfactory for the following reasons:

The concussion injuries of the brain with which we were dealing are dependent on the size of the human brain and the elasticity of the human skull, which is not to be duplicated in any available animal. As a result it is very difficult to administer a concussion injury from which the animal cannot be revived without operation and which, on the other hand, will not be immediately fatal. We used young kittens that have a comparatively thin calvarium; and in dogs we undertook to overcome the skull resistance by freeing an osteoplastic flap in the vertex and after suturing the scalp allowing the wound to heal entirely before applying the injury blow. A machine, fashioned somewhat after a pile-driver, was contrived that would deliver a blow of measured force. The weight was so controlled that it could travel only a measured distance, varying between 2 and 5 mm., after touching the skull. In some cases the blow was applied to the temporal region without previous osteoplastic operation. In all cases a knock-out blow was given; in some cases the animal died immediately and in most instances artificial respiration was required for a time after the blow. All animals were etherized for the preliminary operation. Animals that showed nervousness were etherized before striking the blow. The machine acted with the greatest precision and the animals that were knocked out without previous etherization suffered no more pain than a felled ox.

In about half the animals that survived long enough, an immediate subtemporal opening was made in the skull and dura, this area having been previously shaved and cleaned. The making of the opening required about three minutes.

The points established at operation were, that an animal struck on the vertex, under the proper circumstances, showed at necropsy a basal clot around the cisterna magna and the interpeduncular space and enveloping the pons and medulla. In animals struck in the same way but on which an immediate subtemporal decompression was done, such a clot was either absent at necropsy or at least absent on the side that was drained.

In some animals the blow was applied low down over the temporal region without previous osteoplastic operation. In one of these it was demonstrated that a dog which had an apparently lethal injury, unconscious, requiring artificial respiration, almost totally paralyzed and with a deep and extensive depressed fracture, in which an immediate subtemporal decompression and drainage was done on the opposite side to the injury, could gradually improve until in ten days almost all paralysis had disappeared. For six days this dog had to be fed with a stomach-tube. We have extensive operative and hospital notes on thirty-seven of these animal experiments.

In the City Hospital we found records of forty-two cases in which a single or bilateral subtemporal operation was done in my service for severe unlocalized intracranial injury, during the two years specified. These operations were done by the residents, Drs. Sewing, Hewitt and Hagler, but the majority by myself. During this period the operation was not done indiscriminately but, it being to us a new procedure, it was done, with few exceptions, only in cases of apparently very severe injury. Lumbar puncture was used to determine the presence of free intradural hemorrhage. Of these injuries, five were deep gunshot wounds of the brain.

Besides the behavior of certain individual cases, the most striking observation in this series is that out of

forty-two cases in which the injury could not be located before operation, in thirty-one, through a single or bilateral subtemporal operation, pulpefied brain substance, a subdural clot or severe hemorrhage was found and dealt with. In seven others, either an extradural clot or contused brain was exposed.

On account of the diminutive size of this series of operative cases, no statistical conclusions of real value can be drawn, but as a matter of interest I have lately made certain comparisons, between the results in this series, with a running series of eighty basal injuries not operated on in another service. In these eighty cases without operation, there were seventeen deaths within two hours after admittance and for the sake of comparison, these were eliminated, leaving sixty-three injuries not operated on in which there was survival for two hours or more. In the series with operation, seventeen patients were operated on within two hours after the patient was received. The proportion of very early operations would have been much higher if, in the early part of the series, we had not waited to see how the doubtful cases would do without operation. In the latter part of the series, the majority of patients were operated on within two hours after admittance.

In the series of sixty-three patients not operated on who lived more than two hours, 35 per cent. survived.

Of the forty-two patients operated on, 57 per cent. survived.

The time of operation would appear to be important. In half of the successful cases, but in only one-third of the fatal cases, the operation had been done within two hours. Of the patients on whom operation was performed within two hours (and this means that the dura was open within the two hours) 70 per cent. survived. It has already been stated that in sixty-three patients not operated on surviving two hours or more, only 35 per cent. lived.

The significance of time as a factor in prognosis is indicated by the following data:

Of those not operated on who survived twenty-four hours, 58 per cent. ultimately recovered.

Of those operated on who survived twenty-four hours, 75 per cent. recovered.

Of those who survived forty-eight hours, about 75 per cent. in either series ultimately recovered.

Next to disturbance of the sensorium, the most constant single sign of severe brain injury was disturbance of the pupillary reflex. Of patients giving this sign in the series without operation, 27 per cent. recovered; in the series with operation, 57 per cent. recovered.

This comparison between the two series of cases is not presented with the idea of proving a point, but simply as data that are interesting as far as they go. These figures were only lately compiled, but two years ago after watching the operated series here presented, I concluded to open every skull subtemporally of every patient seen early with supposed unlocalized brain injury, and have done this ever since and believe it is a good procedure. The opening of the cerebellar fossa is relatively difficult and shock-producing, and as in most cases the injury is above the tentorium, I have not used this route.

In practice several points have been developed that had not been thought of when the plan was made.

In the presence of an open fracture of the vertex, when on exposing the dura it is demonstrated that the latter has not been punctured but that there is a subdural clot, the latter can be partially removed and drained through a subtemporal opening with less risk of brain infection or of injury to edematous cortex than if the dura is incised at the site of the original injury. We have done this with satisfactory results several times. Further, if the middle meningeal artery is suspected as being the source of hemorrhage, which is comparatively seldom the case, this vessel can be controlled from the subtemporal wound.

The technic of this operation is simple. A fair area of the temple is shaved and iodin is applied. A curved incision, convexity downward, is made from the pterion to behind the upper attachment of the ear, through the skin and temporal fascia. The temporal artery is caught and the flaps forcefully retracted with hooked retractors. The fibers of the temporal muscle are separated with an elevator and these are drawn apart by retractors held by another assistant. The skull is opened to the size of a half-dollar, the dura incised in several directions, the posterior branch of the meningeal artery being tied or caught with a Cushing clip. The neighboring surfaces of the brain are gently explored and clots hooked out with the finger. A piece of rubber glove drain is inserted in the direction of the clot and the muscle and skin-flaps are closed. The drain is removed in twenty-four hours. In severe cases, in injuries in which there is evidence of intracranial pressure but no clot found, or when the respiration is disturbed by the operation, it is repeated on the other side. The operation is usually done on the right side first. If after drainage ceases at the wound, there is any evidence of pressure, repeated lumbar punctures are done. If carefully and gently done, I do not believe that the operation described is ever likely to cause real damage. It may hasten death by a few hours or minutes, in a patient who has a rupture of one of the large cerebral arteries, but such a patient would be unconscious and already doomed.

Metropolitan Building

ABSTRACT OF DISCUSSION

DR. CHARLES A. ELSBERG, New York: I agree with Dr. Blair concerning the importance and the value of subtemporal decompression in fractures of the skull with brain injury, with hemorrhage under or outside of the dura in a large number but not all of the patients. One has to individualize, and to watch each patient; only those patients who show either very marked symptoms from the beginning or who show steadily advancing symptoms require operative interference. A sign of value in this respect is the change in the eyegrounds. One can almost foretell the symptoms of pressure that will appear from the changes in the retinal vessels. When the symptoms are very marked or if the symptoms are steadily progressive, decompression on one or both sides with or without opening of the dura and with or without incision of the cortex is required. One point which has been to me, at least, of the utmost value in doubtful cases is puncture of the skull. We know very well that in not a few of these patients with fractures of the skull the symptoms are due, not to the gross hemorrhage in or around the brain or outside the dura, but to numerous small hemorrhages throughout the brain substance. It is this condition which used to be called cerebral shock. Conditions of this kind often give the symptoms of a gross hemorrhage on the surface of the brain; to differentiate between the cases in which there is a gross injury (in which a subtemporal decompression with removal of the clot is indicated) from those with multiple hemorrhages (where operation is not indicated, except for a secondary edema), puncture of the skull is most useful. To illustrate: if the introduction of the needle through a small skull-opening down to the dura is

negative, push the needle through the dura and aspirate again. In this way one can differentiate between the cases which need operation and those which do not. There is nothing more disappointing than to open a patient's skull for symptoms and find no marked increase of pressure and realize that you have to deal with a case of multiple hemorrhages in which operation would have been better avoided.

DR. C. A. EVANS, Milwaukee, Wis.: It is apparent that this operation has not met with general acceptance. In order to determine whether or not it is worthy of acceptance I believe it is worth while to report the results obtained. I have operated on twenty-five cases by this method. Most of these were cases of basal fracture, in which the injury itself did not afford sufficient relief from pressure, and lumbar puncture showed bloody fluid. There was a mortality of 20 per cent. Taking the average mortality following such injuries without operation as 50 per cent., this is a reduction in mortality of 30 per cent., approximately what Cushing claims for the operation. The saving of life, however, is not the only consideration, for we must guard against the remote possibilities of the injury. In skull injuries with compound or depressed fractures or when a piece of bone has been removed either by the injury itself or by operation, there is less chance of subsequent trouble than there is in the so-called closed skull fractures. If this is true then surely an opening beneath the temporal muscle, over a mute area of the brain, should lessen the danger of cerebral complications. In two of the cases there was an extradural hemorrhage, and this approach permitted the ligation of the main trunk of the middle meningeal artery and the removal of the clot. I believe that this is the approach of choice in middle meningeal hemorrhage. In two of the cases a primary bilateral drainage was done. Three showed no improvement after unilateral drainage and a later drainage was done on the opposite side with recovery. I do not believe a decompression alone is sufficient. The brain should be elevated and a drain placed in the middle fossa. The whole question of intracranial injuries is one of intracranial pressure. The operation is not one for the open treatment of skull fractures but for the open treatment of intracranial pressure. It matters not what this pressure is due to or whether or not there is a fracture. The important thing is the amount of the pressure and the ability of the brain to withstand it. Trauma to the brain, like trauma to any other part of the body, is followed by the processes of reaction, which is a space-restricting process. Subtemporal drainage relieves this space restriction, absorption takes place, and the circulation is given its best chance to return to normal. There is a large percentage of intracranial injuries that are primarily fatal and the mortality cannot be reduced. Some patients will recover whether operated on or not, either because of the non-severity of the injury, or because of relief from pressure afforded by the injury itself or by lumbar puncture repeated as needed; a large percentage will recover only after a basal drainage, some after unilateral, others only after bilateral drainage.

DR. C. E. RUTH, Des Moines, Iowa: In 1889 I reported a case of injury to the skull in which a clot formed beneath the dura and the skull in a child who fell 15 feet and struck on its head on a plank sidewalk. He was trephined and the clot beneath the dura and one beneath the skull and external to the dura were found. The child recovered, and in reporting the case I said we can expect this to occur only in young children in whom the elasticity of the skull is such that after having been driven against the soft brain it will spring away and tear the branches of the middle meningeal artery loose. Immediately after this Dr. J. McFadden Gaston of Atlanta, Ga., wrote me that he had a case in a man aged 56, the symptoms disappearing under purgation, without operation, and the patient died from disturbances of a large clot that formed in the middle fossa extending from the base to the vertex, disproving my theory with regard to the liability of fracture. In another case which occurred in my experience, which was immediately fatal, a clot as large as my hand extended from the base to the vertex of the skull over nearly the entire skull on one side with absolutely no sign of checking of the skull showing at any point. I wish simply to emphasize the importance of what Dr. Blair has said in his paper with reference to the possibilities of relief from the use of the decompression operation. I take exception to decompression without opening the dura. I can conceive of no such thing being possible except it be in a case in which the blood is extradural. To do a decompression operation it is imperative that we open the dura.

DR. VILRAY P. BLAIR, St. Louis: Dr. Elsberg did not mean to make that statement about not opening the dura. These operative cases were of the most severe type. In almost all of them that was determined by lumbar puncture and by getting free hemorrhage along with the symptoms. Further than this, we became convinced that the chance of saving patients decreased with every hour that the operation was put off. Finally, I believe when one has a brain injury without gross hemorrhage the patient may possibly be helped by a decompression, thus giving a freer circulation.

THE TREATMENT OF TABETIC OPTIC ATROPHY WITH INTRASPINAL INJECTIONS OF SALVARSANIZED SERUM

A PRELIMINARY REPORT

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AND
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While one would expect salvarsanized serum to exert about the same influence on the optic atrophy as on the spinal involvement in tabes dorsalis, we deem the observations made in two cases of tabes with optic atrophy treated by intraspinal injections of salvarsanized serum to be of sufficient interest to warrant reporting them. One was a well-marked case of tabes with optic atrophy; the other showed little outside of the ocular findings.

The technic of Swift and Ellis was followed, as described by Hough[1] and McCaskey.[2] At first the blood was allowed to stand over night to separate the serum, but later separation was effected by centrifugalization and the whole operation completed at one time. The neosalvarsan was dissolved in about 10 c.c. of resterilized freshly distilled water in a glass syringe, and the blood was aspirated under 40 mm. negative pressure into a 2-ounce skimmed milk bottle of a Babcock tester, so that there was comparatively little exposure of either to the air. All injections were made in the office.

CASE 1.—W. T. C., man, aged 35, married, no children, lineman, with negative family history, had measles when 7 years old, and eruption without sore throat ten years ago, diagnosed as measles. He knows of no chancre. Vision has been gradually failing during the past year. There are no other symptoms. General health is good.

Ocular examination, Jan. 13, 1914, revealed right vision $^{20}/_{70}$, left vision $^{20}/_{200}$. Tension is normal. Pupils show marked myosis, and react to light but very slightly. Visual field: Right shows slight concentric contraction. Left also shows defect involving upper nasal quadrant. Color sense has depreciated to such an extent that the patient does not distinguish colors in any portion of field. Fundus shows nerve heads grayish-white with sharp-cut margins. Fundus otherwise normal in appearance.

1. Hough, William H.: Intraspinous Injection of Salvarsanized Serum in the Treatment of Syphilis of the Nervous System, Including Tabes and Paresis, THE JOURNAL A. M. A., Jan. 17, 1914, p. 183.
2. McCaskey, G. W.: The Autoserosalvarsan Treatment of Syphilis of the Central Nervous System, THE JOURNAL A. M. A., Jan. 17, 1914, p. 187.

General examination, Jan. 14, 1914, is negative except for absence of left knee-jerk. There is no anesthesia or incoordination. Wassermann reaction is positive. During the period in which patient was under treatment he was seen frequently and the visual fields were charted many times.

Jan. 23, 1914, 0.9 gm. neosalvarsan intravenously. No reaction. January 24, 30 c.c. 40 per cent. serum in normal salt solution intraspinally. Very little reaction. February 10, 0.9 gm. neosalvarsan intravenously. No reaction. Serum unsatisfactory. February 17, 0.9 gm. neosalvarsan intravenously. No reaction. February 18, spinal injection of 30 c.c. 40 per cent. serum. Little reaction. Subjective improvement in vision. March 14, 0.9 gm. neosalvarsan intravenously. March 15, 30 c.c. 40 per cent. serum intraspinally. March 27, intravenous injection of 0.9 gm. neosalvarsan. March 28, spinal injection of 30 c.c. 40 per cent. serum. April 4, 0.9 gm. neosalvarsan and 30 c.c. 40 per cent. serum. In this case no reactions of any kind followed the intravenous injections of neosalvarsan, and very slight reactions followed the intraspinal injections of serum. These consisted of some pain in head and back of neck. Examination following last treatment showed a slight left knee-jerk. April 24, it was found that while visual acuity, as shown by ability to read test letters, had improved but little, the sector defect in left field had disappeared and patient was beginning to distinguish colors. May 24, vision is: right $^{20}/_{50}$; left $^{20}/_{100}$. Color fields were mapped with 1.5 cm. test object.

CASE 2.—R. W. L., man, aged 37, single, machinist, with negative family history, thirteen years ago had some skin trouble with possible chancre. Patient does not know what diagnosis was made. History otherwise was negative up to two years ago, when vision of right eye began to fail. Vision of left eye began to fail a few months later. For several months right eye has been totally blind. Sight of left has constantly grown worse. Patient had lancinating pains about six months ago.

Ocular examination, February, 1914, revealed right amaurosis. No light perception present. Left vision $^{20}/_{100}$. Entire upper half of visual field wanting. Pupils slightly dilated, right does not react to light directly but consensual reaction is present; left reacts to light very slightly. Patient cannot distinguish colors.

General examination, March 2, 1914, revealed absence of knee-jerks, presence of Romberg sign and marked incoordination of both upper and lower extremities.

March 3, 1914, 0.9 gm. neosalvarsan intravenously. Serum obtained was unsatisfactory. March 10, neosalvarsan 0.9 gm. intravenously. March 11, 30 c.c. of 40 per cent. serum in normal salt solution intraspinally. Quite severe pain in head and back lasting several days. Subjective improvement in vision followed subsidence of reaction. March 24, neosalvarsan, 0.9 gm. intravenously, some leakage occurring outside of vein. March 25, 30 c.c. of 40 per cent. serum intraspinally. Infiltration of right arm at site of injection. April 7, neosalvarsan, 0.9 gm. Ulceration present at site of previous injection on right arm. April 8, 20 c.c. of 40 per cent. serum intraspinally. April 21, patient's visual field was practically the same as when first examined but vision had improved markedly. He read $^{20}/_{40}$; 0.9 gm. neosalvarsan intravenously and 30 c.c. of 40 per cent. serum intraspinally. Quite a severe reaction followed with pain in back, legs and chest. Right arm improved. April 25, subjective vision worse. May 4, subjective vision improved again. Neosalvarsan, 0.9 gm., intravenously and 30 c.c. of 40 per cent. serum intraspinally. Severe reaction followed in a few days. May 18, arm healed. Examination showed that coordination was noticeably improved. Knee-jerks absent. Practically no reactions followed the intravenous injections in this case. May 20, 1914, patient read $^{20}/_{50}$ easily and guessed several letters at $^{20}/_{30}$. Patient now distinguished color, and color fields were mapped with 1.5 cm. test object.

This case is especially interesting because of the rapidity with which sight was being lost and the marked improvement which took place following the intraspinal injections.

APPENDICEAL INFLATION

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This title is open to criticism, but it serves the purpose of introduction to an interesting observation made by myself and assistants at the Brightlook Hospital, St. Johnsbury, Vt.

Nov. 17, 1913, a girl, aged 8, while at stool was suddenly seized with violent cramps in the abdomen, and in a few moments became unconscious, but rallied soon after; nausea and vomiting followed, relieving her distress. Twenty minutes after this attack, I found her exhibiting exhaustion and pallor. The temperature, 98, was subnormal; the pulse was 100; there was slight tenderness in the right quadrant; the bowels were constipated. Her parents informed me that during the past two years attacks similar to this, though not so severe, had occasioned no anxiety, and that the patient had maintained her usual health though she had complained of slight stomach disturbances more or less during this time. I suspected chronic appendicitis with adhesions, perhaps, involving the ileum to a point of partial obstruction.

Acting on my advice the parents consented to an operation, November 20. At the operation I proceeded in the usual manner, and on delivery of the appendix the patient, not being fully anesthesized, began straining with considerable energy, and to my surprise the apparently inoffensive and normal appendix began to inflate to a degree near bursting. With a gauze pad near-by I grasped with both hands the ballooning member to prevent what I felt surely to be impending disaster, and held it until the patient became relaxed, when to my further surprise, I found it necessary to exert gentle pressure to deflate the 2-inch inflation. After removal, I found within the appendix a No. 6 bird shot. No inflammatory changes were observed adjacent to or within the appendix.

This, to my mind, in an emphatic way accounts for many heretofore puzzling phenomena as observed when on operating we have found so little to account for the intense suffering and apparent seriousness of acute cases of ileocecal colic, the appendix usually containing small concretions or foreign bodies.

That the appendix, under favorable conditions, may become enormously inflated is a fact, as in the case noted above. The shot (a fecal concretion may serve in a like manner) occluded the appendix lumen as a ball-valve, preventing ready deflation and thereby causing intense pain and attending phenomena, all of which were, in this case, under authentic observation.

Enforcing Sanitary Laws.—What is true of laws in general is equally true of sanitary laws. Many so-called sanitary and public health laws now on our statutes are an obstacle to progress in preventive medicine. Many good sanitary laws are not enforced and cannot be enforced because public sentiment is not fully alive to the importance of preventive medicine. The natural result of this apathy is a withholding of proper authority and proper appropriations by means of which laws can be enforced. Hence, laws fail in their purpose. One of the greatest needs in efficient public health work in the United States is a national Department of Health, a great central educational institution for research, for information, for cooperation. There must be a well-organized national health department in which must center every function of the government in any way touching public health. The aid and cooperation of this department must be available to every citizen, every community and every city and state board of health in all public health problems, even as the aid of a national Department of Agriculture is now available to every farmer and every farming community. —W. F. King, M.D. in *Jour. Indiana State Med. Assn.*

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SATURDAY, SEPTEMBER 5, 1914

THE NORMAL AND PATHOLOGIC OCCURRENCE OF CHOLESTEROL

Any one who reads the literature of modern medicine must be impressed with the growing importance of cholesterol and its derivatives. In connection with the problems of hemolysis and other features of immunochemistry and in relation to various aspects of pathology, this lipoid substance has received detailed consideration. Some of the views developed in this connection have found expression in THE JOURNAL.[1] In dealing with any component of the organism which is supposed to have importance either in health or disease, it sooner or later becomes desirable to gather statistics concerning the occurrence and distribution of the substance. In the case of cholesterol, few data have been collected as yet by the more recent reliable methods of analysis. From such facts as have been gathered the impression has been gained that the cholesterol content of the individual organs is fairly constant. The newest researches of Thaysen[2] conducted in the Universities at Lund in Sweden and Copenhagen in Denmark, cast doubt on the current belief. The examination of a considerable number of organs and tissues of healthy animals indicates an unexpectedly wide variation in the content of cholesterol and its esters, respectively. The red blood-corpuscles alone furnish an exception with respect to this variability.

It is too early to predict the significance of these unexpected facts. Wide differences in the content of any tissue constituent in conditions of health are sometimes taken as a suggestion that the substance under consideration is an incidental rather than an essential component; otherwise a greater uniformity in the amount present might be expected. The quantity of fat, for example, in the tissues varies widely; whereas the sugar in the blood, the water in the glands, the acid in the gastric juice are instances of the fairly unchanging presence of indispensable physiologic compounds. This mode of reasoning is, however, far from convincing in any attempt to ascertain the significance of a tissue substance. Further data must be awaited.

In another respect, likewise, the cholesterol situation has experienced a change through recent investigations. Certain pathologists, notably Aschoff of Freiburg and his pupils, have classified a group of pathologic fat accumulations under two types: one the glycerol-ester or true-fat type, the other, the cholesterol-ester variety.[3] The conclusions appear to be based largely on the results of purely histologic examinations of tissues. By chemical analyses of a large number of normal and "fatty" organs, however, von Czyhlarz and Fuchs[4] have failed to discover any unique or undue occurrence of cholesterol esters in comparison with the usual fatty substances in cases in which they might be expected to occur on the basis of the reputed morphologic evidence. Until the chemist and morphologist, each using his own suitable procedure of examination, can agree with respect to the alleged existence of the cholesterol types of fatty degeneration or infiltrations we prefer to adhere to the older views regarding the fatty accumulations.

1. Absorption of Fat-Like Substances, editorial, THE JOURNAL A. M. A., Sept. 13, 1913, p. 873; The Heterogeneous Lipoids, ibid., Sept. 13, 1913, p. 875; Reflections Regarding Cholesterol, ibid., Feb. 21, 1914, p. 629.

2. Thaysen, T. E. H.: Beiträge zur physiologischen Chemie des Cholesterins und der Cholesterinester, I. Die Digitoninmethode zur quantitativen Bestimmung des Cholesterins und der Cholesterinester, Biochem. Ztschr., 1914, lxii, 89; II. Der Gehalt normaler Organe an Cholesterin und Cholesterinester, Biochem. Ztschr., 1914, lxii, 115.

3. Kawara, R.: Die Cholesterinesterverfettung, Fischer, Jena, 1911; also Hanes, F. M.: Bull. Johns Hopkins Hosp., 1912, xxiii, 77.

4. Von Czyhlarz, E., and Fuchs, A.: Ueber die Bedeutung des Cholesterins für die Vorgänge bei der pathologischen Verfettung, Biochem. Ztschr., 1914, lxii, 131.

PELLAGRA AND POTABLE WATERS

The belief that there is an etiologic relationship between water and pellagra is not new. Numerous and varied theories have been offered as to the nature of such a possible relation. Quite unique among these hypotheses, however, is the belief that drinking-water, because of the presence of certain chemical constituents, may be of consequence in the causation of pellagra.

A preliminary note on the relation to pellagra of potable waters containing silica in colloidal solution was first presented by Alessandrini and Scala[1] about a year ago. In a recent monograph of nearly two hundred pages[2] their views and work are presented at length. In 1909 Alessandrini[3] began, in Italy, a series of epidemiologic studies on pellagra which led him to regard the disease as etiologically related to potable waters used in pellagrous sections. He first advanced the idea that pellagra was a filarial infection derived from such waters. Subsequent fuller investigation forced him to abandon this supposition, but left him still convinced of the etiologic connection. He associated with himself a chemist (Scala) who, after

1. Alessandrini and Scala: Communication to Reale Accademia Medica di Roma, May 25, 1913.

2. Alessandrini and Scala: Contributo nuovo alla etiologia e patogenesi della pellagra, Roma, 1914.

3. Alessandrini: Nuove ricerche sulla etiologia della pellagra, Policlinico, sez. practica, fasc. 20, May 15, 1910; and fasc. 26, June 26, 1910. Sulla pellagra in Italia, Osservazioni Epidemiologische, Annali di Igiene Sper., 1910, xx (N. S.) Fasc. iv.

much investigation, "formulated the suspicion that silicic acid, dissolved in a colloidal state, could produce a chronic intoxication such as is observed in pellagra." The present monograph is an attempt by these two authors to establish the truth of this suspicion or hypothesis.

Since silicon of whatever form in water must be derived from the soil, the writers discuss the relation of soils to waters and give in detail their method of preparing the colloidal solutions and the gelatinous suspensions of silica used in the experiments. In this study they made use also of potable waters obtained from certain pellagrous sections.

Their experimental work was conducted on guinea-pigs, rabbits, dogs and monkeys. It consisted in the injection and ingestion of the above-mentioned solutions and waters along with numerous variations in the diet of the animals, especially with reference to a diet of maize. In some experiments they made additions to their solutions of certain salts, notably of calcium, sodium and aluminum, for the purpose of testing the action of certain electrolytes on the colloidal silica or of the contemporaneous action of the two (that is, colloidal silica and electrolytes) on the organism. Full protocols with histopathologic findings as well as photographs and charts make the report of their experimental work very complete.

In an analysis and discussion of the results, the authors express the conviction that they have produced in their animals a chronic intoxication which not alone in essential features but even in details closely approximates pellagra as seen in man. This they assert is true not only of clinical phenomena but also of morbid pathologic changes.

Their analysis of the pathogenesis of the condition produced in their experimental animals (and of pellagra as well, of course) consists of an elaborate chemical discussion to which scant justice can be done in limited space. A mere outline must serve to show the basis of their argument. Colloidal silica displays more or less affinity for mineral salts and, from metabolic studies on dogs under experiment, Alessandrini and Scala concluded that "without doubt silica in the animal organism acts by accumulating mineral substances and produces in consequence a destruction of tissues." Tracing farther the various chemical changes and relations which, according to them, the silica undergoes, their next conclusion is, "Therefore it seems to us without doubt that the silica fixes the mineral salts on the proteins of the tissues with a continuous, incessant action quite similar to the action of an enzyme or diastase." Carrying the subject a step farther, they think that "conditions exist in the formation of these compounds of protein substances with mineral salts by which the acids of such salts are liberated, because there is a tendency in said compounds to pass from the state of metallo-acido-protein to that of metallo-protein." By further analysis, argument and experimentation they arrive at their final conclusion, that "pellagra is a malady caused by the forced retention of mineral salts which in turn produces a liberation of acids in excess of the needs of the particular organism; or, in other words, pellagra is nothing more than a mineral acidosis with all of its consequences."

These conclusions, the writers point out, are supported by the metabolic studies made on pellagra by various Italian students, such as Camurri,[4] Nicolaidi and Grillo,[5] Moreschi[6] and others.

Having established to their own satisfaction that "pellagra is a mineral acidosis," the natural treatment would of course be some alkali. For therapeutic use sodium citrate was "selected because it could be used by intramuscular injection without injury, is not caustic, and circulates freely in the tissues, forming by oxidation sodium carbonate, which serves to neutralize the acids present." After preliminary experiments on dogs, several pellagra patients were treated with this substance. Daily injections were given in the gluteal muscles, of 1 c.c. of a 10 per cent. solution. The results were distinctly encouraging in selected cases (that is, comparatively recent cases before permanent damage is done to the tissues).

The prophylaxis of pellagra, if this view is confirmed, resolves itself into the question of supplying communities with suitable potable waters. Some practical suggestions are offered by Alessandrini and Scala for this purpose, the chief of which is that calcium carbonate dissolved in water precipitates the silica which may be present.

Among their general conclusions it may be stated that they lay some stress on the influence of certain electrolytes with which the colloidal silica comes in contact; and they think that alumina, whether in colloidal combination or in a state of simple suspension in water, probably has an action similar to the silica, or at least may aggravate the condition caused by, or reinforce the effects of, the latter. This is of some interest in view of the recent note of Myers and Voegtlin[7] as to the presence of aluminum salts in certain foodstuffs.

Whatever opinion may be entertained concerning this theory, Alessandrini and Scala have certainly brought to its support an apparently arduous and consistent piece of work. This is far more than can be said of many another idea put forward to account for this disease. Moreover, it would seem comparatively easy in this country to gather at least strong presumptive evidence for or against their view by chemical analyses of the potable waters found in sections in which pellagra is prevalent.

4. Camurri: Contributo allo studio del ricambio materiale nei pellagrosi, Udine, 1908; abstr., in Rivista Pel. Ital., viii, 4, 64.
5. Nicolaidi and Grillo: Contributo allo studio del bilancio alimentare nei pellagrosi, Atti del Congresso Pel. Ital., 1912, p. 314.
6. Moreschi: Le anomalie del ricambio azotato nel pellagroso, Il Morgagni, 1903.
7. Myers and Voegtlin: U. S. Pub. Health Rep., June 19, 1914, p. 1625.

THE MARINE BIOLOGICAL LABORATORY AND MEDICINE

The dedication of the new buildings of the Marine Biological Laboratory—the gift of the President of its Board of Trustees, Mr. C. R. Crane—at Woods Hole, Massachusetts, July 10, deserves more than incidental notice in medical circles. Louis Agassiz, in America, and Anton Dohrn, in Europe, were among the first to organize seaside laboratories offering opportunities for biologic investigations that are unique. Dohrn's station at Naples has become a Mecca for students from all parts of the world; and the institution at Woods Hole, which is, in a sense, a lineal descendant of Agassiz's original plant at the island of Penikese, founded in 1872, promises to have a usefulness scarcely inferior to that of the European seaside laboratory.

The interrelations of biology and medicine have become so clearly established in recent years that they no longer demand emphasis even before an audience of practitioners. A biologic training has become recognized as one of the indispensable fundaments on which the study of medicine is properly reared. Biology is related not only to the affairs of every-day life, but also to the routine of medicine, in which it furnishes the indispensable foundation. Hygiene and the disciplines of public health rest on biologic factors. One aspect of modern biology—the cell theory—is an adequate illustration of how a single great generalization in this comprehensive science has revolutionized the study of pathology and physiology, the very basis of medicine. For this reason medicine can only look with pride and interest at the development of new places and instruments for biologic research and at the promise of increased benefits and new discoveries which shall contribute to the advancement of our profession. The Marine Biological Laboratory deserves especial mention, furthermore, for the splendid example which it has furnished of opportunities for investigation that shall be unrestricted by the dictates of custom, inherited prejudices, or the unconcealed demands of local interest and sectional factions. Its progress has been an indication of the stability and permanence of a democratic organization in which freedom has been the dominant character—the freedom of a democracy of learning, as it was termed by one of the speakers at the dedicatory exercises. Freedom of organization, he added, is our one watchword. Cooperation is another. Both are vital and they are interdependent. And so we have, at Woods Hole, a union of forces of scientific men, and through them of institutions that they represent, in order to create conditions as ideal as possible for the progress of science.

In the dedicatory address, on "The Needs of Research," Dr. R. S. Woodward,[1] the president of the Carnegie Institution of Washington, called attention to how far the popular mind, and how far many disciplined minds, may depart from the meaning we attach to the term research. Even in medical circles one may find indications of false ideas of what the term comprehends. Although an appreciation of the advantages of the spirit of patient investigation over that of stolid conservatism, on the one hand, or reckless inquiry on the other, is making itself manifest widely, there are still many who look on research as a sort of irrational achievement. We should never forget, says Dr. Woodward, that the investigator lives usually in the presence of majorities which do not understand him and that progress is largely conditioned by these majorities. Thus, to journalists and to their readers it would seem that research is akin to necromancy and that its results are produced chiefly by witches of the male sex, otherwise designated in the polite literature of our day as wizards. Closely akin to this infantile fallacy, Dr. Woodward adds, is the more subtle error entertained by a majority, perhaps, of our highly educated contemporaries, that the more remarkable results of research are produced not by the better balanced minds, but by aberrant types of mind popularly designated by that word of ghostly, if not ghastly, implications, namely, "genius."

Men of science are on trial in these days. Money is being furnished lavishly for the endowment of research institutions and the promotion of investigation. It is important to take advantage of the current favorable attitude on the part of a helpful portion of the public and encourage its enthusiasm for the modern research enterprises. The Woods Hole Laboratory certainly represents the latter worthily.

1. Woodward, R. S.: The Needs of Research, Science, Aug. 14, 1914, p. 217.

A NEW SERUM REACTION FOR THE DIAGNOSIS OF GASTRIC CARCINOMA

Recently several serum tests for the diagnosis of carcinoma have been proposed. Among these may be mentioned Abderhalden's test for specific ferments for cancer-cells, Brieger and Trebing's antitrypsin reaction, the miostagmin reaction of Ascoli, Crile's isolysin reaction and von Dungern's complement-binding reaction. In the hands of careful workers experienced in the special technic, each of these methods seems to demonstrate a substance in the serum of cancer patients which reacts more or less specifically on a substance contained in cancer tissue; but none of the methods hitherto proposed has seemed by virtue of its reliability of result and simplicity of technic to merit general adoption as a diagnostic measure. This does not mean that such a method may not be found, or that further improvement in some of these methods may not make them suitable for general use.

Recently Kelling[1] described a test which in the matter of simplicity answers all practical requirements,

1. Kelling: Wien. klin. Wchnschr., 1914, xxvii, 927.

being essentially much simpler than the simplest modification of the Wassermann reaction. Whether or not it will meet the requirement of accuracy of result must be determined by further tests. While experimenting on heterolytic serums, Kelling observed that the serum of cancer patients possessed the property of dissolving the red corpuscles of certain other species, notably the hen. The presence of an inhibiting substance in some serums and of lysins in some normal serums prevented the use of the test in this form for diagnostic purposes. These sources of error were obviated by diluting the patient's serum 1:10 with physiologic salt solution and incubating for twenty-four hours at 37 C. (98.6 F.). Equal parts of this diluted serum and a 5 per cent. suspension of hen corpuscles were then incubated for from twenty-four to forty-eight hours and the hemolysis noted. In what way the incubation of diluted serum eliminates the inhibiting substance, which seems to be the case, the author does not explain. It was found that this modification gave positive reaction in about 90 per cent. of cases of gastric carcinoma. As controls, serum from patients in all conditions which require differential diagnosis from carcinoma were used, and also normal serum. Kelling reports a consecutive series of 250 cases of common diseases of the gastro-intestinal tract tested by this method. Among these are sixty-five cases of carcinoma, of which fifty-eight, or about 90 per cent., are positive. Of the 185 other conditions, six cases, or less than 3 per cent., give positive reactions. These six include suppurating cholecystitis, tuberculosis of the peritoneum, appendiceal abscess, tuberculosis of the intestines, "influenza gastrica" and an anemia in which the patient had repeatedly received normal human blood by transfusion.

Kelling finds that a combination of the serum reaction and the miostagmin reaction of Ascoli is of advantage, as the two do not give errors in the same types of conditions.

Another combination which he recommends and which in his series of cases gives 100 per cent. positive in gastric carcinoma with 0 per cent. positive in controls, is with the test for occult blood in the feces. The test for small quantities of blood in the stools evidently is not specific for carcinoma, but the combination of this with the serum test seems to reduce the percentage of error.

Evidently this test is not etiologically specific; but neither is the Wassermann test, which uses as antigen an extract of non-syphilitic tissue. We are unable to explain the biochemical principles which underlie many clinical tests, but this is not sufficient reason for rejecting them if trial proves their merits. Kelling rightly maintains that, in general, no diagnostic test is expected to give accurate results in 100 per cent. of the cases, and that no single test is sufficient basis for a diagnosis; that any test should be regarded as additional evidence, while the diagnosis rests on the sum of all the evidence. Obviously the lower the percentage of error in a given test the greater is its weight in the sum of the evidence.

A simple laboratory procedure which will be of service in detecting early carcinoma of the stomach will receive a hearty welcome by the medical profession. Further reports on the use of the serum test described by Kelling will be awaited with much interest.

THE PURINS AND ALIMENTARY BACTERIA

One of the experimental difficulties that have been encountered in attempting to explain the transformations of the nucleoproteins and their derivatives, the purin substances, in the organism has consisted in the fact that the total intake of these compounds could rarely be accounted for in the outgo. If, for example, a known quantity of some purin such as hypoxanthin, xanthin, guanin, or even uric acid be ingested, the increased excretion of the supposed end-product of this series ordinarily falls short of what would be expected if the oxidative conversion had been complete up to the uric acid stage in the body. This fact has repeatedly been demonstrated in man. When extract of meat, a product comparatively rich in hypoxanthin derived from muscle tissue, is consumed, the increase in uric acid or other purins in the urine will rarely account for more than about one-half of the purin of the food intake. For this reason it was assumed and taught for a long time that the production and destruction of uric acid proceed simultaneously in the organism. Accordingly the amount found in the urine at any period was believed to represent the balance between these two antagonistic processes.

When, however, it was observed that the introduction of either purins or uric acid into the body parenterally, instead of orally, resulted in a much larger consequent output of uric acid, another explanation suggested itself. Sivén[1] argued that perhaps ingested purins are destroyed in considerable part within the alimentary tract through the agency of bacteria. When taken into the body by way of the mouth, therefore, the quantities that would actually be absorbed after escaping the possibility of loss through microbial degradation might be decidedly smaller than the original intake; hence the output would be correspondingly diminished. Injected purins, on the other hand, would be protected from such destruction and consequently reappear quantitatively as uric acid, their end-product.

Although no serious obstacle has stood in the way of explaining the disappearance of purins taken by mouth in the way just outlined, certain observations have not spoken in its favor, to say the least. It has been known that bacteria can decompose purin compounds, but the evidence has given the impression that

1. Siven, V. O.: Ueber den Purinstoffwechsel des Menschen, Arch. f. d. ges. Physiol., 1912, xclv, 283.

this change is not easily accomplished[2]. A renewed investigation of the subject by Sivén[3] leaves no doubt that a very considerable amount of purins can undergo prompt destruction through the action of such organisms as *Bacterium coli*, and under conditions such as are believed to exist in the digestive tube. We may safely conclude, therefore, that a liberal proportion—as much as 50 per cent. in some cases—of the purin intake can lose its identity before it has had a chance to be absorbed from the gastro-intestinal tract. Whatever enters the blood-stream, however, doubtless escapes destruction and thus forms the precursor of the exogenous uric acid of the urine.

THE PRICE OF CARELESSNESS

The commonplace gains enormously in impressiveness when familiar and long-recognized facts are collected and tabulated. Fourth of July accidents were regarded as inevitable and of comparatively small importance until THE JOURNAL undertook the systematic collection and compilation of the statistics. Presented in the aggregate, they shocked the nation. The American people have long been accustomed to accounts of railroad accidents in the public press. It is only the occasional accident of startling character or unusual magnitude which arouses comment. The public does not appreciate the enormous toll which is paid every year in loss of life and limb because of avoidable accidents on our railroads.

Accident Bulletin 50, just issued by the Interstate Commerce Commission, contains a summary of the accidents resulting in personal injuries caused in the operation of interstate railways during the months of October, November and December, 1913. The facts presented are so appalling that if they were found anywhere else than in a government publication they would be regarded as extreme exaggerations. During these three months, 2,792 persons were killed and 50,776 persons were injured in connection with railway operation. Of these, 191 were killed and 3,726 injured in train accidents; 2,675 were killed and 21,769 injured in accidents other than train accidents, such as fires, floods, landslides and explosions affecting the right of way, and accidents in connection with railroad operation other than those of trains and roadway, while 117 deaths and 29,007 injuries were industrial accidents to employees working on tracks, bridges, stations, enginehouses, shops, wharves or elsewhere. Of the 2,792 persons killed, thirty-four were passengers killed in train accidents, and 137 were employees killed in train accidents. Eighty-five passengers were killed from all causes and 730 employees from all causes, making a total of 815 passengers and employees. The 1,860 other persons killed included trespassers, non-trespassers and employees not on duty, while 117 employees in addition were killed in industrial accidents not connected with railroad operations.

Detailed tables showing the cause and character of the accidents are most interesting and illuminating. For instance, of the 21,769 persons injured through train and other accidents, five persons lost their eyesight, ninety lost arms, forty-seven persons lost their hands, 213 persons lost legs, 143 persons lost feet. Many of those crippled will be incapable of supporting themselves for the balance of their lives and will consequently become dependents. The total loss of working time due to accidents is not shown. With over fifty thousand persons injured in three months, however, the economic loss must be enormous. At this rate there are probably nearly twelve thousand persons killed and over two hundred thousand persons injured every year on our railroads. The majority of these accidents are avoidable either through proper safety devices supplied by the operating company or through care in operation on the part of employees. The price paid for carelessness as shown by the official statement of fact is too enormously heavy to be tolerated.

2. Schittenhelm, A., and Schröter, F.: Ueber die Spaltung der Hefenucleinsäure durch Bakterien, Ztschr. f. physiol. Chem., 1903, xxxix, 209; 1903, xl, 62; 1903, xl, 70; 1904, xli, 284.

3. Sivén, V. O.: Ueber den Purinstoffwechsel des Menschen, iii, Mitteilung, Zur Frage der Spaltung der Purinkörper im Verdauungskanale, Arch. f. d. ges. Physiol., 1914, xlvii, 582.

Current Comment

OHIO IN LINE

One of the most readable and progressive medical journals published by any state organization is the *Ohio State Medical Journal*. It is characterized not only by the scientific value of its articles, but also by the "snap" and "life" which permeate its various departments and especially by the way in which it serves up its state news and matters of interest to the local field which it covers. In fact, the only just criticism that might have been made of this journal was that concerning the standards which governed the admission of advertising matter. This criticism is now removed, for in its August issue the *Ohio State Medical Journal* says in part:

> We will not, in the future, print the advertising announcement of any medicinal product that has not received the sanction of the Council on Pharmacy and Chemistry of the American Medical Association.
>
> In other words, *The Journal* will no longer boost unethical nostrums.
>
> Furthermore, we will not print the announcements of sanatoria that are not operated on ethical lines; or of any product, medicinal or otherwise, that does not make a true statement of its value, or does not offer the intending purchaser a "square deal."
>
> We believe that this will make our advertising columns much more valuable to our readers.

This move speaks well for the Ohio profession. As has been said many times, the immediate result of raising the standard of admissible copy to the advertising pages of any journal is a falling off in revenue. This means that the medical profession of Ohio must give its official publication active, moral and financial support.

There are, to-day, twenty-three state journals and six privately owned medical journals that have adopted the standard of the Council on Pharmacy and Chemistry as regards proprietary medicine advertisements. These journals are proving that the standard of decency is not an impracticable one. May the physicians of Ohio rally to the support of their journal; they can render no more effective service in the fight against medical fraud and in behalf of scientific medicine.

DIPHTHERIA ANTITOXIN

It may be thought by some that the whole question of the use of antitoxin in diphtheria is settled. Nevertheless, it may be worth while to emphasize certain factors that are not always borne in mind in using it. The chief ones are the quantity to be given and the time and method of administration. The average dose is given in the Pharmacopeia as 3,000 units. While probably a sufficient initial dose in many cases, this quantity is not enough to satisfy the factor of safety. Although 3,000 units will neutralize the toxins formed in the human organism in an average case, it must be remembered that some time elapses before complete absorption takes place and hence before all the antitoxin becomes effective. Meanwhile the average case at the time of injection has become a severe if not a fatal one. A severe case terminating fatally might have remained a mild, average case had a larger initial dose been given. There is a daily growing sentiment that the amount necessary to effect a cure should be given in one dose at the earliest possible hour. Woody[1] states that "no case of diphtheria, however mild, should receive less than 10,000 units." His experience covers almost ten thousand cases and shows a reduction in mortality of 3 per cent. when large doses are used as compared with smaller ones. The point is emphasized by Anderson[2] that 10,000 units are of more value when given early than 100,000 or 200,000 when given later. It is safe to say that 10,000 units would be much nearer the average dose used in the large metropolitan hospitals than the 3,000 units stipulated in the Pharmacopeia. Although promptness of administration after the onset of the first signs and symptoms has been proved to be the most important element in the successful use of antitoxin treatment, there must be considered as well the method of injection. Smith[3] and Park[4] have shown that when the subcutaneous route is used, the maximum amount of antitoxin is found in the circulating blood only after three or four days. If antitoxin is given intramuscularly this period is of course shortened. It is still further shortened by intravenous injection, which method has been advised for extremely severe cases. When this extreme method is adopted a much smaller amount of antitoxin is required, as action is immediate. It cannot be too often emphasized that antitoxin must be given early; that with a small patch of membrane a smaller dosage may be required than when a complete laryngeal, pharyngeal and nasal involvement exists, and that the subcutaneous injections are more slowly absorbed than deep intramuscular ones. The authority of the Pharmacopeia, in its forthcoming revision, should be lent to the aid of experience by stipulation of a larger average dose—for example, 10,000 units—and a sliding scale to inform the physician that the great quantities are sometimes essential.

1. Woody, S. S.: The Use of Antitoxin in Diphtheria, THE JOURNAL, this issue, p. 861.
2. Anderson, J. F.: THE JOURNAL, this issue, p. 862.
3. Smith: Jour. Hyg., 1907, vii, 205.
4. Park: Boston Med. and Surg. Jour., 1913, clxxiii, 73. Collected Studies from the Bureau of Laboratories, Dept. of Health, New York City, 1912-1913, vii, 27.

WAR AND PREVENTIVE MEDICINE

Our Paris correspondent has not written since the declaration of war—August 1. The London *Lancet* of August 22 contains a last word from its Paris correspondent, concerning the beginnings of the war as they affected Paris. He writes: "The greater number of medical men, even those of mature age, in Paris have already gone to take their posts in the Army Medical Service, and your own correspondent is writing you this, his last letter for some time to come, only a few hours previously to his departure to take charge of an ambulance corps, as *médecin chef* in the Army of the East." Lists of medical men remaining in Paris, with their addresses, have been posted in each quarter of the city. Many hospitals have been evacuated and their patients assigned to others. The remaining hospitals care for the wounded, who are already beginning to arrive. Most of the wounded will not be taken to Paris, as this city may perhaps be placed in a state of siege, but are being carried to more distant points. The Faculté de médecine has also been converted into an ambulance station, as well as all the lycées and the public and private schools. Great fear has been expressed by Professor Chantemesse lest infectious diseases should break out in epidemic form. A general revaccination of the population of Paris has been ordered, and huge quantities of antityphoid serum have been prepared.

SOME FACTORS AFFECTING FETAL DEVELOPMENT

Some weeks ago we commented[1] on recent experiments of Bailey and Murlin[2] who have shown that the initial loss of weight in the first few days following birth may be prevented by extra feedings of a formula of the same composition as the colostrum. In view of the fact that the infant, during gestation, must be affected by the nourishment of the mother with whose metabolism its own is so closely bound, Evvard[3] has undertaken experiments to show to what extent this influence may operate. A number of gilts (young sows, prospective swine mothers) were fed on different foodstuffs. The basal ration was corn alone, which is quite deficient in protein and calcium. As supplements were used meat-meal, containing about 60 per cent. protein, 15 per cent. ash and 10 per cent. fat, also clover and alfalfa. The latter substances also contain large quantities of protein and calcium. It was found that in every case the supple-

1. The Nutrition of the New-Born, editorial, THE JOURNAL A. M. A., Aug. 1, 1914, p. 404.
2. Bailey, H. C., and Murlin, J. R.: The Energy Requirement of the New-Born, Proc. Soc. Exper. Biol. and Med., 1914, xi, 109.
3. Evvard, J. M.: Some Factors Affecting Fetal Development, Tr. Iowa Academy of Science, 1913, p. 325; Nutrition as a Factor in Fetal Development, Proc. Amer. Breeders' Assn., 1912, viii, 549.

mented rations resulted in pigs which were larger and stronger at birth than when an equal weight of corn alone was fed. The character of the coat also was better when oil-meal was used than when meat-meal was given. Thus Evvard states that oil-meal has been noted from time immemorial as a coat producer. On the other hand, meat-meal invariably produced larger-boned offspring than did other types of food. The same experiments were carried out with sheep, and it was again shown that the ration tends to affect in some manner the size and vigor of the offspring although the differences are not so marked as when swine are fed entirely on grain. An outlook for further important conclusions is opened up by these experiments. The possibilities are numerous. The production of a quickly-growing, vigorous offspring will offset to a great extent the numerous attacks made on the struggling infant by the diseases of infancy. The human infant is helpless for a period relatively far longer than that of other mammalia. Any knowledge which will aid to give it a more advantageous start on the difficult road it must travel represents progress in infant welfare.

Medical News

CALIFORNIA

Sanatorium Burned.—Fire starting in a defective flue destroyed the main building of the Pasadena Sanitarium, South Pasadena, with a loss of $30,000.

European Travelers.—Drs. Charles H. Whitman and Orville O. Witherbee, Los Angeles, and Drs. Andrew W. and Ada S. C. Morton, San Francisco, have returned from abroad.——Dr. Aaron S. Green, San Francisco, is believed to be detained in Berlin.

Psychopathic Ward Opened.—The psychopathic building, recently erected at the Los Angeles County Hospital at an expense of $175,000, has been completed and was formally opened August 3. The ward can accommodate one hundred patients, but only thirty have thus far been transferred.

Personal.—Dr. Raymond B. Mixsell, Pasadena, has sailed for Japan.——County Health Officer Edmund C. Sawyer, Los Angeles, was presented with a gold deputy sheriff's badge by the janitors of the county building, recently.——Dr. Alexander S. Kelly has been reelected president of the Oakland Board of Education.

COLORADO

Home from Abroad.—Drs. Frank N. Cochems, Salida; Dr. and Mrs. Leonard Freeman, Denver; Dr. Caleb W. Presnall, Trinidad, and Dr. and Mrs. Daniel G. Monaghan, Denver, have returned from abroad.

Colorado Physicians Abroad.—Dr. and Mrs. Edgemont D. Welsh, Colorado Springs, sailed for Glasgow, August 25.——Dr. and Mrs. Samuel Caldwell, Colorado Springs, are believed to be in Vienna.——Dr. William A. Kickland and family, who have been in Germany, have reached England.

Personal.—Dr. William B. Davis has returned from his post of duty as vice-consul of the United States at Guadalajara, Mexico.——Dr. James A. Rutledge, Woodmen, has been elected medical director and superintendent of the Colorado Sanatorium, Woodmen.

State Association Meeting.—The annual meeting of the Colorado State Medical Association will be held in Boulder September 9 to 11 under the presidency of Dr. Oscar M. Gilbert, Boulder. The sessions of the organization will be held in the Physicians' Building and in the University of Colorado.

FLORIDA

New Officers.—Manatee County Medical Association at Tampa, August 8: president, Dr. John B. Leffingwell, Bradentown; secretary, Dr. Holton.

Bids for Laboratory Building.—Advertisements have been made by the State Board of Health for bids on the public health laboratory building for the board to be erected at Pensacola at a cost of $20,000.

Open Air School.—The Florida Open Air School of which Dr. William M. Stinson, Jacksonville, is vice-president, an institution devoted largely to outdoor sports and exercises, will open in Jacksonville October 1.

Personal.—Dr. Hiram Byrd, Port Orange, formerly assistant state health officer, has been appointed president of the Florida Tuberculosis Sanatorium, Trilby.——Drs. William P. Adamson, John S. Helms and Louis A. Bize, Tampa, have returned from abroad.——Dr. James M. Jackson, Jr., Miami, has been appointed a member of the Malaria Committee of the National Drainage Congress.

GEORGIA

New Officers.—First District Medical Society at Savannah: president, Dr. Herman W. Hesse; secretary-treasurer, Dr. Charles Usher, both of Savannah.

Home from Abroad.—Dr. William L. Davis, Albany; Dr. Marion C. Pruitt, Atlanta, and Dr. George R. White, Savannah, have returned from Europe.

Personal.—Dr. DeWitt C. Gilles of the staff of the Bureau of Animal Industry to the United States Department of Agriculture, as the result of a tentative examination, has been appointed chief food inspector to the Board of Central Commissioners of Savannah.——Dr. Carl C. Aven has been appointed chief of clinics at the Atlanta Medical College.——Dr. Clifford A. Peacock has been appointed medical inspector of the schools of Columbus.——Dr. Sidney Walker has been appointed local surgeon at Dublin for the Wrightsville and Tennville Railroad, succeeding the late Dr. Ezra New.

IDAHO

Personal.—Drs. Clifford M. Cline, Idaho Falls, and Franz H. Brandt, Boise, have returned from abroad.——Dr. Charles L. Gritman, Moscow, and Dr. and Mrs. William F. Howard, Pocatello, have sailed for Europe.

County Society Organized.—The president and secretary of the Idaho State Medical Association met with the physicians of Bonner County at Sand Point, July 6, and organized the Bonner County Medical Association, electing the following officers: president, Dr. Ones F. Page, Sand Point; vice-president, Dr. Leseir J. Stauffer, Bonner's Ferry, and secretary-treasurer, Dr. Charles P. Stackhouse, Sand Point.

ILLINOIS

New Hospital.—A new hospital has been opened by A. W. Chandler in Rochelle as a public institution. It is open to all regular practitioners.

Home from Europe.—Dr. Charles B. Horrell, Galesburg, has returned from Europe.——Dr. George N. Kreider, Springfield, sailed from London on his return, August 22.

Werner Improving.—Dr. Frederick W. Werner, Joliet, who has been critically ill with septicemia at the Silver Cross Hospital, Joliet, is slowly improving although not yet out of danger.

Higher Requirements.—In the schedule of minimum requirements issued by the State Board of Health, August 4, this clause is included, "No medical college shall be considered in good standing for the purpose of the Illinois Medical Practice Act, that does not require after July 1, 1918, of all students, excepting graduates of colleges of arts or science to whom advanced standing is given, in accordance with the requirements of this board as a condition of graduation, an attendance on five full courses of lectures in five separate years."

Chicago

Resigns Professorship.—Dr. W. A. Newman Dorland has resigned as professor of obstetrics in the Bennett Medical College.

Home from Europe.—Dr. Truman W. Brophy and daughter; Dr. Franklin H. Martin and niece; Dr. Samuel Salinger and Dr. James P. Way have returned from abroad.

Chicago Physicians Abroad.—Dr. Oscar T. Roberg, who has been in Berlin, has reached Sweden on his way home.——Dr. and Mrs. Peter C. Schenkelberger are detained in France, and Dr. and Mrs. Frederick Owsley have reached London from Berlin.

IOWA

Personal.—Dr. Percy B. Battey, Farragut, has been appointed a member of the medical staff of the Iowa State Hospital, Independence.——Dr. William H. McClain, has been appointed postmaster of Conrad.

More Land for Epileptic Colony.—It is announced that the State Board of Control intends to dispose of sixty acres of land at the site of the State Epileptic Colony, Woodward, and will purchase 160 acres additional more suitable to the purposes of the colony.

In and From Europe.—Dr. Daniel L. Cole and family, Oskaloosa, are believed to be marooned in Germany.——Dr. Elmer P. Weih, West Liberty; Dr. John E. Brinkman, Waterloo, and Dr. and Mrs. Herman A. White, Clinton, have returned from abroad.

Child Welfare Bureau Established.—A permanent Child Welfare Bureau has been established in Iowa City by the Commercial Club and several local organizations of women. At this bureau, parents may obtain information as to the proper care of children, and any child in ill health, whose parents are indigent, will be examined and treated free of charge.

MARYLAND

Farm Donated for Hospital.—The heirs of T. Harrison Garrett have presented the Maryland Hospital for Consuptives, Eudowood, the Pleasant Plains Farm, consisting of 188 acres of fertile land adjoining the hospital property, which has been leased by the hospital for several years.

European Travelers.—Drs. William H. Welch, Baltimore, is in Bern, Switzerland.——Dr. William S. Halsted, Baltimore, returned from Europe, August 11.——Dr. Grant Ferguson of Johns Hopkins Hospital, Baltimore, sailed for Europe, August 6.——Dr. Frank Martin, Baltimore, is reported to be on the continent.

Graduates of Liberal Art Colleges.—Information from the University of Maryland School of Medicine not received in time for the Educational Number shows that ten of the 1914 graduates of that college also possessed degrees in liberal arts. Of the 3,594 graduates of medical colleges this year, therefore, there were 817, or 22.7 per cent., who also held degrees from standard colleges of liberal arts.

Suit Settled Out of Court.—The case of Mrs. Sallie Sterling Sadler, Baltimore, against Dr. George H. Riggs, Ijamsville, in which she obtained a verdict of $6,000 on March 20, for alleged unlawful confinement in the sanatorium of Dr. Riggs, in which Judge Bond of the superior court of Baltimore granted a motion of Dr. Riggs for a new trial on the ground of excessive damages, has been agreed and settled out of court.

Society to Honor Dr. Beanes.—The Star Spangled Banner Society of Prince George County on September 3 restored, with appropriate ceremonies, the tomb of Dr. William Beanes, located at Marlboro. Dr. Beanes served as surgeon in the General Hospital, Philadelphia, during the Revolution and it was his imprisonment on a British man-of-war which prompted Francis Scott Key to visit him in the hope of securing his relief, and Key's detention during the bombardment of Fort McHenry inspired him to write the Star Spangled Banner.

MASSACHUSETTS

Home from Abroad.—Dr. and Mrs. William E. Chenery, Boston, and Dr. George Van B. Buehler, Cambridge, have returned from Europe.

Pasteur Treatment in Boston.—The State Board of Health announces that the Pasteur treatment for hydrophobia may now be obtained in Boston.

Resigns from Faculty.—Dr. Charles E. Buck, professor in pediatrics in the College of Physicians and Surgeons, Boston, has resigned, following the resignation of two trustees of the institution.

Improvements to Hospital.—The Ladies' Charitable Union of Lawrence has instituted many important improvements at the Lawrence Hospital. At present a children's ward and a new nurses' home are in course of construction and the power house of the institution is being enlarged.

Medical Examiners Appointed.—Dr. Daniel J. Finnegan, Gloucester, has been appointed medical examiner and Dr. Philip P. Moore, Gloucester, associate medical examiner for Essex County.——Dr. A. Vincent Smith, Middleboro, has been appointed associate medical examiner for Plymouth County.

MICHIGAN

State Society Meeting.—The Michigan State Medical Society will hold its forty-ninth annual meeting at Lansing, September 9 to 11, under the presidency of Dr. Guy L. Kiefer, Detroit.

Interest in Health Train.—Record crowds have visited the State Health Special Train during its stay in the copper country. The train has now left for The Soo, Ishpeming, Marquette and other intermediate towns.

New Officers.—Upper Peninsula Medical Society at Houghton, August 13: president, Dr. James G. Turner, Houghton; vice-president, Dr. Richard A. Burke, Diorite. The next meeting will be held at the Soo.

Home from Europe.—Drs. Frank A. Kelly, Alexander W. Blain and Angus McLean, Detroit; Austin F. Burdick, Lansing; Dr. and Mrs. William F. Hake, Grand Rapids; Dr. and Mrs. William G. Bird and son, Flint, and Dr. Charles E. Boys, Kalamazoo, have returned from Europe.

Michigan Physicians Detained Abroad.—Among the Michigan physicians who are compelled to remain abroad on account of war conditions are, Drs. Max Ballin, Detroit; Dr. and Mrs. William G. Young, Grand Rapids; Dr. Eva Rawlings, Kalamazoo; Drs. Alva N. Collins and Samuel C. Hanna, Detroit; Dr. William T. Dodge, Big Rapids; Dr. Charles H. Baker, Bay City, and Dr. Rowland H. Harris and Elizabeth K. Harris, Battle Creek.

NEW YORK

State Hospital Transferred.—The Long Island State Hospital for the Insane, which has hitherto been leased from the city of New York to the state for the sum of one dollar per year, since the state act went into effect in 1893, was transferred by deed from the city to the state of New York, August 10.

Beef Tuberculosis Board.—In accordance with an act of the legislature authorizing the scientific study of bovine tuberculosis, its economic and health effects on the state, and a report with recommendations to the legislature, Governor Glynn has appointed a committee consisting of Drs. Theobald Smith, Hermann M. Briggs, Linsly R. Williams, Philip Van Ingen and Henry L. K. Shaw, together with a number of veterinarians, cattle breeders and other laymen. An appropriation of $5,000 is available to pay the expenses of the commission which, at the governor's request, will meet immediately after the members receive their designations to complete the organization and to put the investigation under headway.

New York City

Must Give Full Time to Work.—The commissioner of health has issued an order prohibiting all heads of bureaus receiving a salary of $5,000 or more, from engaging in any work not connected with the department.

Personal.—Drs. Abr. L. Wolbarst, George Bolling Lee, New York City, and Edward E. Hicks, Brooklyn, have returned from abroad.——Dr. Michael J. Thornton has been appointed chief of staff of the psychopathic ward of the Kings County Hospital, succeeding Dr. William B. Mosely, deceased.——Dr. Jacob Oshlag has been appointed a member of the board of managers of the Manhattan State Hospital.

City Farm for Drug Users.—A committee of city officials of which acting Mayor McAneny is chairman, have decided to ask the Board of Estimate and Apportionment for an appropriation which will enable the city to utilize a part of its Inebriate Farm Colony in Orange County as a sanatorium for drug victims. Practically all the space available in the city hospitals has been given over to this class of patients and it is realized that something must be done to prevent drug victims from crowding out other patients.

Advisory Council of Health Board at Work.—Shortly after taking office the commissioner of health appointed an advisory council in order to effect a closer contact with the public and to secure well informed criticism and suggestions from experts in public health matters. This advisory council consists of representative men and women prominent in various public health activities. At the first meeting of this council suggestions were offered as to new lines of work by the Department of Health. As a result of the discussion at that time seven committees were organized as follows:

Records, Laboratories, Child Hygiene, Infectious Diseases, Foods and Drugs, Sanitation and Public Health Education. All of these committees have held meetings and many valuable suggestions have been presented; these as far as is possible have been acted upon. It is believed that the work of these committees and of the advisory council as a whole will prove of invaluable assistance in the administration of the work of the Health Department.

NORTH DAKOTA

Medical Board of Appointments.—Governor Hanna has reappointed Drs. John E. Countryman, Grafton; Alexander J. McCannel, Minot, and Paul Sorkness, Fargo, members of the State Board of Medical Examiners.

Personal.—Dr. Ralph E. Weible, Fargo, has gone abroad. ——Dr. Gustav F. Ruedeger, formerly director of the State Public Health Laboratory, Grand Forks, has returned from the West and has taken up his duties as director of the Health and Research Laboratory at LaSalle, Ill.

State Hospital Overcrowded.—The State Board of Control estimates that one-half million dollars is required for the construction of new ward buildings for the North Dakota State Hospital for the Insane, Jamestown. The institution at present has 316 more patients than its normal capacity.

OHIO

New Officers.—Morgan County Medical Society at McConnellsville, August 14: president, Dr. Leroy S. Holcomb, Pennsville; secretary-treasurer, Dr. Clarence E. Northrup, McConnellsville.

Swimming Pools Contaminated.—An investigation of the swimming pools of Columbus by the health department revealed contamination with colon bacilli in one case and insanitary conditions in others. Dr. Louis Kahn recommended that the pools be treated with chlorid of lime.

State Institutions Crowded.—Statistics gathered by the State Board of Administrations show that state institutions are not capabale of caring for all the criminal and insane. Nearly 4,000 names are on the waiting lists in the various counties. When the legislature convenes the board will urge additional hospital facilities.

Summit County Health Protective Society.—The headquarters of this society are at Akron, and a campaign has been begun with the object of increasing the membership to 1,500. The society has resolved to better the sanitary conditions in Akron, and with this object in view will endeavor to secure the support of every citizen.

New Officers.—West Side Physicians' Club, Dayton, reorganized August 21: temporary president, Dr. Grant S. Staub; temporary secretary, Dr. Tedd L. Gregg.——Morgan County Medical Society at McConnellsville, August 14: president, Dr. Leroy S. Holcomb, Pennsville; secretary-treasurer, Dr. Clarence E. Northrup, McConnellsville.

In, and Returned from Zone of War.—Dr. James G. Grant, Akron, with his wife and four children, are reported to be in Berlin.——Dr. Max Stamm, Fremont, is reported to be in Bern, Switzerland.——Drs. Colin R. Clark and James A. Sherbondy, Youngstown; Dr. John V. Hartman, Findlay, and Dr. Henry K. Yaggi, Salem, have returned from abroad.

Anti-Tuberculosis Society Districts State.—The representatives of the Ohio Society for the Prevention of Tuberculosis and the Division of Tuberculosis of the State Board of Health, have divided the state into twelve tentative districts, each of which includes from four to six counties, wherein campaigns are to be inaugurated for the establishment of tuberculosis hospitals.

Sanitation and Disease Prevention Campaign Started.—The Canton Board of Health has started an educational campaign on sanitation and disease prevention. A topic will be chosen and discussed at each regular meeting of the board. Topics already chosen for present and future discussion are: "Rats and Their Relation to Human Plague"; "Pure Milk"; "Infant Mortality," and others allied thereto.

Personal.—The Secretary of the Treasury, on recommendation of the Surgeon-General, U. S. P. H. S., has appointed Dr. Eugene F. McCampbell, Columbus, secretary of the Ohio State Board of Health, collaborating epidemiologist, in the United States Public Health Service.——Dr. Edward K. Cook, police surgeon, of Hamilton, has resigned.——Dr. Stanton K. Crawford, Lakewood, has been appointed superintendent of the Five Counties (Columbiana, Mahoning, Portage, Stary and Summit) Tuberculosis Hospital, Springfield Lake, near Akron. The hospital will probably be ready to receive patients early in October.——Dr. Robert C. Paul, Shreve, announces that he will soon move to Wooster, where he will succeed Dr. Kate M. C. Johnson as superintendent of a private hospital.

Cincinnati

Marooned in Europe.—Drs. B. Knox Rachford, Joseph Ransohoff, John M. Withrow and J. Henry Schroeder are among the Cincinnati physicians who are held in Europe on account of war conditions.

Personal.—Dr. J. Stewart Hagen has been appointed city physician, with Drs. Harry M. Box and Joseph W. Hall as assistants.——Dr. Harry T. Summersgill has been chosen as superintendent of the University Hospital, San Francisco.

OKLAHOMA

Personal.—Dr. George A. Boyle, Enid, is taking a trip to Cincinnati, Battle Creek and Chicago, to get new ideas on hospital construction.——Dr. Edward N. McKee, Enid, is taking an automobile trip to Chicago.

Home from Europe.—Prof. Edwin De Barr, head of the department of chemistry of the State University, Norman, has returned from Germany.——Dr. and Mrs. Antonio D. Young, and Dr. and Mrs. Robert M. Howard, Oklahoma City, and Dr. and Mrs. Walter E. Wright, Tulsa, have returned from abroad.

OREGON

New Officers.—Eastern Oregon Medical Society at Pendleton: president, Dr. George W. Tape, Hot Lake; secretary-treasurer, Dr. Thomas M. Henderson, Pendleton (reelected).

Personal.—Dr. Orla B. Miles, Salem, has succeeded Dr. J. Olin Van Winkle, Salem, as health officer of Marion County. ——Dr. Frank E. Boyden, Pendleton, has returned from Europe.

Alumni Meeting.—At the annual meeting of the Alumni Association of the Medical Department of the University of Oregon, held in Portland, more than one hundred were present. The program of the three-day meeting consisted of clinics, the presentation of papers, symposiums and postgraduate works.

PENNSYLVANIA

Home from Europe.—Drs. Arthur H. Bernstein and James F. Saltry, Scranton, and Dr. William J. Winters, Shenandoah.

Fire in Nurses' Home.—Fire destroyed the nurses' home of the Pittsburgh Hospital, August 19, causing damage of about $5,000.

Personal.—Dr. John R. Stein, Shenandoah, is reported to be seriously ill in the State Hospital, Fountain Springs.—— Dr. Nathaniel C. E. Guth has taken charge of the Laby clinic at Allentown.

Magazine for Anti-Tuberculosis League.—The initial number of the *Out o'Door Magazine*, the official publication of the Anti-Tuberculosis League, has just appeared at Oil City. It contains interesting information regarding Bon Air and Grand View, the two sanatoriums of the organization.

Emergency Hospital Plan.—Dr. George J. Van Vechten, superintendent of the Scranton Bureau of Health, and the mayor of the city, are discussing plans for buildings to be erected at the State Emergency Hospital. Of the $25,000 appropriated by the council last year for this purpose, $7,500 has been expended for a tract of 5 acres on the East Mountain and the balance is to be expended in constructing buildings, laying out roads, clearing underbrush and fencing the property. There is already a nine-room house on the site and it is proposed to erect an administration building, one building for the exclusive use of small-pox cases, and two bungalows, each containing three private rooms, and a ward building with accommodations for from eight to sixteen patients.

Philadelphia

New Hospital Chartered.—A charter authorizing the establishment of a new hospital for the study and treatment of diseases of the digestive system was granted in common pleas court by Judge Ferguson, August 28.

Hospital Corner-Stone Laid.—The corner-stone of the new wing of the American Oncologic Hospital at Thirty-Third

and Powelton Avenue, was laid with appropriate ceremonies on August 28. Addresses were made by the president and secretary of the board of officers.

Personal.—Dr. W. H. F. Addison, assistant professor of histology and embryology at the University of Pennsylvania, has made his way to Holland and will return in September. ——Dr. Edward Ledholtz, assistant professor of physiology at the University, who has been working at the University of Bonn, has not been heard from.——Dr. Henry Lowenburg has returned from abroad.

Funds Needed for the Consumptive Hospital.—On August 23 an appeal for funds to carry on the work for the Home for Consumptives at Chestnut Hill was sent out by the Philadelphia Protestant Mission. This institution, which has at present seventy-nine patients, is directed by the mission and is supported almost entirely by voluntary contributions, and the officials have unpaid bills on hands amounting to $5,000.

SOUTH CAROLINA

Greenville Physicians Abroad.—Drs. R. E. Houston, Ernest W. Carpenter, Thomas T. and Curran B. Earl are detained in Europe by war conditions.

New Officers.—The Second District Medical Association at Bamberg: president, J. J. Cleckley, Bamberg; secretary-treasurer, Dr. Vance W. Brabham, Cope.

Antityphoid Inoculation.—Dr. Asbury F. Coward of the State Board of Health reports that more than 10,000 antityphoid inoculations were made in the state during July.

Tuberculosis Camp Open.—The Tuberculosis Camp established by the Associated Charities of Columbia at Ridgewood has been opened. There are at present four tents and more will be added from time to time as may be required.

Professional Building.—A two-story and basement brick building is being erected on Main Street, Greenville, which will be used by physicians and dentists. The building is to be known as the Professional Building.

Personal.—Dr. James H. McIntosh, Columbia, was shot and seriously wounded, July 22. A reward of $5,000 for the arrest and conviction of the man who shot Dr. McIntosh has been offered by J. W. Norwood, a banker of Greenville. ——Dr. Joseph E. W. Haile, Columbia, charged with malpractice, was exonerated when the case was brought to trial.

Gift to Georgia College.—Dr. William J. Young, Barnwell, has given $25,000 to the Medical Department of the University of Georgia, Augusta, to be known as the William J. Young Library fund, and to be devoted to the improvement and development of the library of the college. The conditions of the gift provide that the principal be invested and that the income shall be used by the board of directors of the medical department for purchasing and binding such books, magazines and periodicals as may be designated by the dean.

SOUTH DAKOTA

Personal.—Dr. C. A. Homan, Aberdeen, has returned from abroad.——Dr. Eurtis T. Green, Brookings, is reported to be detained in Europe.——Dr. Henry E. Binger, Clark, has accepted a fellowship in the University of Minnesota and will move to Minneapolis.——Dr. Leslie G. Hill, Watertown, has resigned after eight years' service as a member of the South Dakota State Board of Health and Medical Examiners.

WASHINGTON

Home from Europe.—Dr. Saxe W. Mowers, Tacoma, and Walter E. Keehl, Cle Elum, have returned from Europe.

New Officers.—Washington Association for Relief and Prevention of Tuberculosis at Tacoma: president, Dr. Christen Quevli, Tacoma; vice-president, Dr. Wilson R. Johnston, Spokane; secretary, Prof. John Weinzirl, Seattle, all reelected.——North End Medical Society at Seattle: president, Dr. Charles A. Warhanik; secretary-treasurer, Dr. Frederick A. Slyfield.

Personal.—Dr. Joseph M. Audic, Spokane, has started for France, where he will join his regiment, the Eleventh Infantry.——Dr. Harry A. Shaw, Seattle, has been elected physician of the Police Relief Association.——Dr. Frank C. Robinson has succeeded Dr. Lawrence R. Quilliam as physician of the State Prison, Walla Walla.——Dr. Elwin Brown, Tacoma, will open a sanatorium for liquor and drug addiction at Lake Bay this fall.

WISCONSIN

New Officers.—First District Medical Society at Hartland, August 7: president, Dr. Willibald J. Wehle, West Bend; secretary-treasurer, Samuel B. Ackley, Oconomowoc.

European Travelers.—Drs. F. Gregory Connell and Neil Andrews, Jr., Oshkosh, and W. Weber Kelley, Green Bay, have returned from abroad.——Dr. Adolph Roos, Oshkosh, with his wife and daughter, is believed to be in Vienna.

GENERAL

Conference on Tuberculosis.—The Mississippi Valley Conference on Tuberculosis will be held at St. Louis, October 6 to 8.

Osler Urges Typhoid Vaccination.—Sir William Osler has sent a letter to the London *Times*, urging the emphatic necessity of enforcing antityphoid vaccination in the British army.

Missouri Valley Physicians to Meet.—The twenty-seventh annual meeting of the Medical Society of the Missouri Valley will be held at Colfax, Iowa, September 17 to 19. The Hotel Colfax will be the headquarters and meeting place, and on September 19 a clinical session will be held at Des Moines. Dr. Flavel B. Tiffany, Kansas City, is president, and Charles Wood Fassett, St. Joseph, Mo., is secretary of the society.

Sioux Valley Physicians Meet.—At the annual meeting of the Sioux Valley Association in Sioux Falls, S. Dak., the following officers were elected: president, Dr. Robert Evans, Fort Dodge, Iowa; vice-presidents, Drs. Julius A. Hohf, Yankton, S. Dak., and Charles L. Sherman, Luverne, Minn.; secretary, Dr. George S. Browning, Sioux City, Iowa, and treasurer, Dr. Walter R. Brock, Sheldon, Iowa.

Bequests and Donations.—The following bequests and donations have recently been announced:

Boston University School of Medicine, $5,000 by the will of Dr. Alema J. Flint.

For a hospital in memory of his brother, William H. Thorndike, $200,000, by the will of George L. Thorndike, East Boston.

To equip a ward in a hospital in Philadelphia, devoted to contagious diseases, $25,000, by the will of James M. Holt.

Aultman Memorial Hospital, Canton, Ohio, a lot for the endowment fund and a second lot to be applied to the endowment fund after the death of Susan Palmer, by the will of Johnson Sherrick.

Mrs. J. Clark Stewart, a trust fund of $35,000, by the will of Dr. J. Clark Stewart, Philadelphia.

Chester County (Pa.) Hospital, a donation of $6,000 for the endowment of a ward, by Mr. and Mrs. Jackson A. Watt, Oxford.

The New Orleans Plague Situation.—Since the report made last week, two cases of human bubonic plague bacteriologically confirmed have been found in New Orleans. Case 21. Mary Jones, colored, female, widow, aged 84, housewife; residence 1734 Felicity Street; sickened August 26 with left femoral bubo; diagnosis made positive August 28. Case 22. Elmore H. Read, male, aged 30; nativity United States; white; residence 4415 Carondelet Street; sickened August 26; suspicious August 27; positive diagnosis made August 28; right femoral bubo. Cases 65 to 74 of rodent plague have been reported up to August 29. During the week ended August 22, the Outgoing Quarantine Department fumigated 98 vessels with sulphur and 18 vessels with carbon monoxid; burned 5,981 pounds of sulphur; inspected 19,912 tons of outgoing freight and issued 29 clean and 3 foul bills of health. The Department of Overland Freight Inspection inspected 5,889 cars; ratproofed 1,280 cars; condemned 10 cars and killed one rodent in a car. The Department of Field Operations trapped 9,630 rats; fumigated 4 premises; disinfected 92 premises; inspected 3,482 premises; placed 88,316 poisons; served 1,450 notices; made 675 abatements and inspected 117 dead. The Department of Laboratory Operations received 9,329 rodents and examined 7,850; of these 15 were suspicious and in 9 the rats were found infected. Thus far 3 necropsies have been made; 54,885 rodents have been trapped and 51,985 rodents have been examined.——It is reported by the New Orleans papers that the State Board of Health has decided that it cannot add to its appropriation of $10,000 already made and expended in this campaign, and the governor is said to have announced that the state could not provide anything from the $150,000 authorized by the legislature to be borrowed for the fight. It is understood, however, that notwithstanding this action, there will be no abatement of the work as mapped out.——At the outset of the campaign it was suggested by Surgeon-General Blue that the federal government and the city of New Orleans should each bear

two-fifths of the expense and the state one-fifth.——It is also reported that in the daily press that the seven plague patients in the North Rampart Street Isolation Hospital have practically recovered from the disease and will be discharged within a week.

CANADA

Canadian Army Medical Service.—There are about 350 medical officers in the Canadian militia and many of these will probably be called on for active duty in the field.

Public Health Meeting Canceled.—Owing to the unsettled conditions due to the war in Europe, it has been decided to cancel the meeting of the Canadian Public Health Association, which was to have been held in Fort William and Port Arthur, Ont., September 10 to 13.

New Health Officers' Association.—The municipal officers of health in the counties of Haldimand, Wentworth, Norfolk, Brant, in the province of Ontario, have organized an association and elected Dr. Thomas A. Bertram, Dundas, president, and Dr. James Roberts, Hamilton, secretary.

Sanatorium Work Suspended.—The Anti-Tuberculosis League of Saskatchewan has had to suspend work on a new sanatorium for tuberculosis being built at Fort Qu'Appelle. The total cost of the building was to be in the neighborhood of $225,000 and of this amount $150,000 has been spent. Those who were to find the balance have been unable to find the funds, hence the suspension of the work.

The Academy of Medicine and the War.—A special meeting of the Academy of Medicine, Toronto, was held August 27. One thousand dollars was voted from the funds of the academy to the Toronto Patriotic Fund to provide for the dependents of those who had gone to the front. It was also unanimously decided to undertake without charge, the professional care of the needy dependents of the volunteers. A committee of past presidents will arrange to look after the practices of the professional members who have departed with their regiments.

Personal.—Drs. Andrew R. Gordon, Toronto, and John M. Elder, Montreal, presented the addresses in medicine and surgery, respectively, at the annual meeting of the Saskatchewan Medical Association of Saskatoon, August 18-20.——Mr. Irving Howard Cameron, professor of surgery in the University of Toronto, has offered his services to the British Government, it is understood in connection with base hospital work.——Dr. Wallace A. Scott, Toronto, will be in charge of the Army Medical Service of the Toronto branch of the first Canadian contingent.——Hon. Dr. Beeand, a former member of the Laurier Government, Canada, early entered the Belgian service.——The assistant superintendent of the Toronto General Hospital, Dr. Alfred K. Haywood, is off to the front with the Queen's Own Rifles of Toronto.——Dr. Duncan N. Maclennan, Toronto, has returned from a trip to the Mediterranean.——Dr. Richard A. Reeve, professor of ophthalmology in the University of Toronto, has secured passage and is returning from England.

LONDON LETTER

LONDON, Aug. 14, 1914.

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

(*Concluded from page 794*)

Cancer of the Breast

Dr. W. L. Rodman, Philadelphia, opened a discussion on this subject. He said that chronic fibrous hyperplasia with cysts, the result of abnormal involution of the breast, is often mistaken for cancer. It generally occurs about the menopause but may be seen in patients from 20 to 30. It differs from cancer in that it is frequently bilateral and painful (early cancer is not painful). The pain is increased before each period, and the superficial veins become enlarged. Cancer, unlike benign neoplasms, soon becomes fixed, but the fixation at first is so slight as to be detectable only by careful examination. Dimpling of the skin, however slight, indicates cancer unless chronic mastitis had previously existed. Too much attention has been paid to dimpling of the nipple. It does not occur in more than 52 per cent. of carcinomas, and is present in 5 per cent. of benign growths and more often in abnormal involution. There is the difference, however, that in cancer the nipple, as well as retracted, is infiltrated, fixed and immobile, whereas in benign growths the nipple is mobile. We should get away from the old teaching that cancer is a disease after 40; 20 per cent. occur between 30 and 40. The differentiation of benign from malignant cysts is even more difficult than in the case of solid tumors. Thick granular discharge from the nipple is suggestive of carcinoma; in abnormal involution the fluid is fairly sanguineous. Pure blood nearly always means a papillary cystadenoma. In at least 25 per cent. of the cases a skilled diagnostician will fail to make a correct diagnosis. The proper way is exploratory incision. Benign growths are convex on section, pink or pinkish-white; malignant growths are usually concave and creak under the knife and have a gray tint. Though the expert may be able to distinguish benign from malignant growths by inspection, the only safe way is a frozen section at the time of operation.

Mr. Sampson Handley differed from Dr. Rodman in a few small points. Cancer of the breast is not always a fixed tumor and the skin does not always dimple over it. He described his now well-known theory of dissemination by lymphatic permeation. He said that secondary deposits rarely occur at a greater distance than 24 inches from the primary growth.

Intestinal Stasis

Sir Berkeley Moynihan opened a discussion on this subject. The theory of intestinal stasis, he said, asserts that at definite points along the intestinal canal certain membranes, veils or webs are frequently found, which delay the passage of the contents, producing intoxication, which directly causes some diseases and encourages others. He admitted that these membranes are frequently present but believes them to be congenital. As long ago as 1899 he described them in fetuses. Jackson's membrane is commonly congenital, but the bands found at the hepatic and splenic flexures are not seldom congenital. He agreed with Lane's view as to their origin, but he doubted that the bands are responsible for intestinal delay, for the intestine is not hypertrophied. Delay undoubtedly occurs in the typical case of intestinal intoxication, not from obstruction but from inability of the enfeebled intestine to empty itself. The early cases can be greatly helped by massage and paraffin. If operation becomes necessary the lower end of the ileum, cecum and ascending colon are the parts best removed. He condemned ileosigmoidostomy as it nearly always leads to regurgitation back into the colon. The surgeon exceeds his duty if he deals with anything beyond demonstrable lesions. He admitted that he had seen cases of rheumatoid arthritis improved beyond expectation by operative abdominal measures; but it should be remembered that drainage of an infected gall-bladder or removal of a diseased appendix will cure some cases of this disease. Moreover, most of these cases are not benefited by operations for intestinal stasis. He demurred to the wide range of diseases said to be curable by operations for intestinal stasis.

Sir Bertrand Dawson admitted that the successes of colectomy are very striking, but side by side there are great failures. The best results are obtained when the large bowel is definitely diseased. He demurred to the doctrine that the colon is a useless organ just as well removed as left. The mortality of colectomy is considerable, and it is often followed by frequent actions of the bowels at irregular intervals.

Sir Arbuthnot Lane said that in view of the lateness of the hour all he would say was that he was content that his views should be judged by the results.

On behalf of the American surgeons a committee, Drs. Leonard Freeman, Floyd W. McRae and William L. Rodman, drew up resolutions of thanks for the hospitality shown by London surgeons and hospitals to the Clinical Congress of Surgeons of North America.

The Annual Meeting of the British Medical Association

The eighty-second annual meeting of the British Medical Association was held at Aberdeen, unfortunately at the same time as the Clinical Congress of the Surgeons of North America in London. The president, Sir Alexander Ogston, delivered an address on the "Making of a Scottish Medical School." He traced the history of the district from the earliest times, when it was inhabited by the Celts. Later it was invaded by Scandinavians, Teutons and Saxons, who were more maritime races. Their physical differences from the Celts could still be observed. He estimated that 7 per cent. of the population were still of a tolerably pure Celtic type. The newcomers gradually fused with and no doubt in some cases dispossessed the Celts. The university was founded in 1494, a bull for this purpose being granted to Bishop Elphinstone by Pope Alexander VI. The first professor of medicine was James Cuming, who was appointed in 1503.

THE ESTABLISHMENT OF A DEFENSE FUND

At the meeting of the representative body there was an echo of the controversy in connection with the insurance act. A discussion took place on a proposal to establish a special fund for the defense of professional interests chiefly in view of future developments in national insurance, which might be injurious to panel doctors. The object is to make opposition effective by guaranteeing support to those members who otherwise could not afford to resist. The proposal was carried by a large majority. A debate then took place as to whether the fund should be administered by a trust or a trade union. The chief reason in favor of a trade union was that the funds would be inviolable against an action for damages. Several objections were raised. It was pointed out that the case of physicians is widely different from that of railway men or miners. The cohesion of the latter is not possible among physicians who work apart and often in antagonism to one another and not under a common employer. Although a majority report of the council favored the establishment of a trade union, it was decided that the fund should be administered by a trust.

MALINGERING

Sir John Collie, who in consequence of extensive experience with claims for disablement has become an authority on malingering, said that frequently the happening of an accident so perverted the outlook of the victim that he persistently dwelt on and exaggerated all his unusual sensations and in process of time he genuinely believed that he was not fit to work. While labor had become more and more monotonous than it used to be, the stimulus to return to work was much less. Every recollection of an accident brought a further injury to the nervous system and the mind. When confronted with these difficult cases the first and all-important step was to make as certain as possible that no organic disease existed. This was not easy, because certain organic diseases in the incipient stages closely resembled hysteria and neurasthenia. It was often a nice point how much was due to the accident and how much to the patient's own unconscious mental processes. In a railway accident passengers who happened to be asleep or tipsy did not suffer nearly so much subsequently from mental symptoms. It was unfair to insurance companies that physical disabilities should cause incapacity of work for four or six months simply because the patient had not been taken in hand from the mental point of view. He concluded that many of the cases were functional nerve cases and there was less deliberate fraud than might be supposed.

CONFIDENTIAL DEATH CERTIFICATES

Sir Victor Horsley spoke of the need of improvement of the nation's statistics, the importance of which, from the point of view of public health, had, he said, never been realized by the statesmen responsible for preparing them. The association should produce a real "nomenclature of diseases," from which the old loose names, which led to so much inaccurate certification, were expunged. The English and the international lists of diseases were chaotic nonsense. There should be direct confidential certification of the cause of death, and the certificate of death and the cause of death should be separate documents. Among the reforms he advocated was the certification of stillbirths, which would secure for the nation statistics on a subject on which it had none, namely, antenatal conditions, which were to a large extent responsible for infant mortality.

(To be continued)

BERLIN LETTER

[Delayed in Transmission]

BERLIN, July 31, 1914.

Personal

Dr. Abel has accepted a call as director of the Hygienic Institute at Jena.

The Strassburg anatomist and anthropologist, Gustav Schwalbe, celebrated his seventieth birthday August 1. He joined the faculty of Freiburg in 1871, but in the same year went to Leipsic as professor extraordinary and in 1873 was called to Jena as regular professor of anatomy as the successor of Gegenbaur. In 1881 he went to Königsberg and two years later settled at Strassburg as the successor of Waldeyer. Among Schwalbe's works on anatomy are especially to be noted his study of the circumvallate papillae discovered by him, and also his studies on the growth of bone and cartilage, on the lymph channels of the eye and on the topography of the brain. Of his anthropologic studies those on the Neandertal skull, his method of measuring the skull and his investigation of the most ancient races of man are to be noted. Schwalbe has published two text-books on the anatomy of the nervous system and of the organs of sense, and he founded the *Zeitschrift für Morphologie und Anthropologie* and the *Anatomischer Jahresbericht*. Schwalbe resigns his position at the end of the summer semester.

Pathology and Therapy of Cancer

Two important addresses treating of the problem of cancer and its treatment were delivered a few days ago in the Berlin Surgical Society by von Hansemann, the pathologist, and Bier, the surgeon. Von Hansemann divided the history of cancer research into a number of periods.

HISTOLOGY OF CANCER

The first is the histologic morphologic period.

This was the beginning of exact investigation by scientific methods. The anatomic structure of cancerous tumors was studied and a number of characters were learned which distinguish them from healthy tissues and from pathologic changes of other sorts. This has the enormous advantage in a practical way that one may operate early on the basis of an early diagnosis of cancer and thus often completely eradicate the malignant disease.

ETIOLOGY OF CANCER

Then followed the etiologic period which, in many places, was not distinguished by an equal scientific character as the first period. This period of investigation had an important result in the development of the irritation theory. This teaches that the origin of a cancerous tumor depends on some sort of irritation, but in such a way that irritants of various kinds may produce the same sort of tumor, or that irritants of the same sort in different individuals may produce different kinds of tumors. Thus we know that the irritation produced by the Roentgen rays may cause cancer. The fine experiments of Fibiger of Copenhagen have shown that such irritation may also be produced by parasites, not in the sense that parasites cause cancer in the same way as the comma bacillus causes cholera, but that the presence of the parasites produces an irritant that in one case may have no consequences; in another case a slight inflammation may be set up; in a third, a benign growth, and in the fourth a genuine cancer may develop.

EXPERIMENTAL CANCER RESEARCH

The third period is that of experimental investigation. On a single occasion it was found possible to transmit a genuine cancer from one rat to another. Then a tumor was found in mice with which experiments were conducted for years almost exclusively. As the work was carried on with great diligence and with abundant means, important scientific results were reached with reference to the biology of cells and to the conditions which favor and hinder the growth of cells; but no results of practical importance for cancer in man have been realized, for this tumor of the mouse differs in important respects from the cancer of man and the observations made on it cannot, as a rule, be transferred to human cancer. Just recently, for the first time, through the researches of Fibiger mentioned above, something can be hoped for from experimental investigation because in his experiments genuine cancer was induced.

TREATMENT OF CANCER

Lastly we come to the therapeutic period. As is well known, the therapeutic results which have been obtained with newly discovered remedies, partly by Wassermann, partly by Neuberg and Caspari, have all been achieved in mouse cancer, but so far the same treatment cannot be employed in human beings. The treatment by radium and the Roentgen rays does not stand in the same class. It is rather to be compared with surgical treatment inasmuch as it destroys the tumor but does not actually cure the disease. An actual curative remedy, like the salicylates in articular rheumatism, is known only in such diseases as those in which occasionally the patients recover without treatment. Hitherto, no case is known in which a genuine cancer became cured spontaneously. Von Hansemann emphasized this most decisively, and repeated it with marked energy in the discussion, saying that in all the cases that have been published as spontaneous cures, the disease either was not true cancer or only parts of the tumor receded and there was no general recovery. Consequently von Hansemann comes to the conclusion that it will never be possible to find a specific remedy for cancer.

ROENTGENOTHERAPY OF CANCER PLUS INJECTION OF BLOOD

Bier's address on this subject indicates that new hopes may be entertained. Some years ago, he made experiments with the blood of healthy animals. Lately he has resumed these in conjunction with roentgenotherapy and in a number of cases he has reached quite remarkable results, at least for the time being. He showed a patient who had been repeatedly operated on for cancer of the throat, and still the tumor had grown anew and of greater extent. The pictures which Bier showed from the time previous to the treatment made it clear to every one that the case was very severe. A deep radiation with the Roentgen rays was applied to the tumor, while at weekly intervals from 8 to 10 gm. of the blood of healthy hogs was injected. No trace of the cancerous tumor can be detected now in this patient. Bier did not venture to say how permanent the result would be or what would be the future fate of this patient and others treated in the same manner, and he would not state even his presumptions. An opinion on the favorable side is not possible until after some years.

EFFICACY OF ROENTGENOTHERAPY

Bumm's address, delivered in the Hufeland Society on the cure of deep-lying carcinoma by the Roentgen ray from the surface of the body, is also calculated like the statements of Bier to overthrow the pessimistic view of Hansemann in regard to the curability of cancer. Bumm regards his experiences as very favorable. With radio-active substances, a curative effect cannot be obtained at a greater depth than 2 or 3 cm. from the surface without injury to the neighboring tissues. But in the case of superficial cancerous growths, a quick and apparently permanent cure is obtained. In advanced cases in which infiltrations in the neighborhood of the primary focus have formed, a cure of the superficial cancerous growth is obtained, but under the cicatrix in the depths of the tissues the carcinoma continues to grow, and physicians who see the patient after six months or a year find a healed primary focus with fresh nodules in the deeper tissues. No success has been obtained by the attempt to act on the deeper lying parts by the use of larger doses of radio-active substances or by prolongation of the radiation. The use of the Roentgen rays produced better results as the Roentgen tubes furnish many thousand times the amount of radiant energy that is obtainable from the available quantity of radio-active substances, if the superficial tissues are protected from the intense caustic action and a sufficient action in the deeper parts is obtained without the danger of severe injury to the tissues. The cure of cancer is a question only of the quantity of rays which can be applied to the pathologic tissues. As the intensity of the radiation diminishes rapidly in proportion to the distance below the surface, only the hard rays can be used. Bumm is of the opinion that the Roentgen rays afford the remedy which alone is capable of checking the growth and thus securing a permanent cure of deep, advanced carcinoma.

Marriages

ALFRED L. FOWLER, M.D., Atlanta, Ga., to Miss Helen Achenbach of Roslyn Ranch near Rand, Colo., August 12.

CHARLES F. W. BOYE, M.D., Cumberland, Md., to Miss Cecelia H. Flaig, formerly of Catskill, N. Y., August 22.

HUGH FORSYTHE LORIMER, M.D., Oxford, Ohio, to Miss Sarah Florence Shaw of New Concord, Ohio, August 18.

ALEXANDER EDWIN MCCORNACK, M.D., Elgin, Ill., to Miss Josephine Jernstad of Ishpeming, Mich., August 26.

FREDERICK JOHNSON, M.D., Eau Claire, Wis., to Miss Augusta Lange of New Freedom, Wis., August 12.

ANNE EUNICE COCHRAN, M.D., Brooklyn, N. Y., and Mr. John Emmet Carey of New York City, August 8.

EDWIN VAN NOTE, M.D., Hamilton, Mo., to Mrs. C. M. Perry of Pasadena, Cal., at Galena, Mo., July 9.

CALVIN BREWSTER COULTER, M.D., New York City, to Miss Grace Dickey of Iroquois, S. Dak., August 19.

MAURICE A. HANSON, M.D., to Miss Alice McCoy, both of Osage, Iowa, at Charles City, Iowa, August 13.

WILLIAM S. HECTOR, M.D., to Miss Edna E. Dickens, both of Chicago, at Crown Point, Ind., August 22.

HERBERT ROWELL STOLZ, M.D., to Miss Margaret Post, both of San Francisco, August 8.

Deaths

Haskett Derby, M.D. Harvard University Medical School, 1858; a Fellow of the American Medical Association; known throughout the United States as an ophthalmologist; one of the founders and once president of the American Ophthalmological Society; for more than forty years a practitioner of Boston; a medical officer of the Army during the Civil War; for thirty years consulting surgeon to the Massachusetts Charitable Eye and Ear Infirmary; founder of the eye clinic in the Carney Hospital, Boston, in 1887; for many years lecturer on ophthalmology at Harvard Medical School and trustee of the Public Library and of the Children's Institutions Department of Boston; died at his home in Falmouth Foreside, Maine, August 21, aged 79.

Maynard Gooding Burgess, M.D. College of Physicians and Surgeons in the City of New York, 1898; a veteran of the Spanish-American War during which he served in Cuba as a medical officer on the staff of General Wheeler, being discharged on account of permanent disability; died at his home in Herkimer, N. Y., August 14, from the effects of a gunshot wound of the head, believed to have been self-inflicted with suicidal intent while despondent on account of ill health, aged 38.

Carrington MacFarlane, M.D. College of Physicians and Surgeons in the city of New York, 1861; assistant surgeon of the Eighty-First and One Hundred and Fifteenth New York Volunteer Infantry, during the Civil War; one of the organizers of the Oswego City Hospital and for many years a member of the staff and board of directors; prominent also in commercial enterprises in Oswego, N. Y.; died at his home in that city, August 12, aged 77.

Edwin Pynchon, M.D. Eclectic Medical Institute, Cincinnati, 1873; Medical College of Ohio, Cincinnati, 1876; a Fellow of the American Medical Association and a member of the American Academy of Ophthalmology and Oto-Laryngology; and professor of rhinology, laryngology and otology in the Chicago Eye, Ear, Nose and Throat College; died at his home in Chicago, August 28, from uremia, aged 67.

Robert P. Marshall, M.D. Miami Medical College, Cincinnati, Ohio, 1873; a member of the Medical Society of the State of Pennsylvania; president of the Armstrong County (Pa.) Medical Association and one of the founders of the Kittanning, Pa., Fair Association; died at his home in Kittanning, August 19, from cerebral hemorrhage, aged 66.

Albert Merritt Cook, M.D. University of Buffalo, N. Y., 1881; Bellevue Hospital Medical College, 1883; for twenty-five years a practitioner of Newcastle, Pa., and a member of the staff of the Shenango Valley Hospital; died at his home in Pasadena, Cal., August 16, aged 59.

James Luther Vail, M.D. Eclectic Medical Institute, Cincinnati, 1899; of Little Rock, Ark.; aged 45; died in St. Vincent's Infirmary, Little Rock, August 17, from the effects of injuries received in a collision between his automobile and another motor car.

Wilmot Frederick Miller, M.D. University of Michigan, Ann Arbor, 1887; of Milwaukee; a Fellow of the American Medical Association, and a specialist in nervous diseases; died in St. Mary's Hospital, Milwaukee, August 14, from diabetes, aged 53.

Charles Betts, M.D. University of Wooster, Cleveland, Ohio, 1890; a Fellow of the American Medical Association; proprietor and superintendent of the Jefferson Hospital, Toledo, Ohio; died at Beulah, Mich., August 16, from heart disease, aged 49.

A. N. Perkins, M.D. New Orleans School of Medicine, 1858; for many years a practitioner of South Texas, and for eighteen years State Quarantine Officer at Sabine Pass, Tex.; died at the home of his daughter in Houston, Tex., August 13, aged 89.

James Robie Wood, M.D. Bellevue Hospital Medical College, 1867; of New Brighton, N. Y.; a Confederate veteran; while returning from a visit to his daughter in the Philippine Islands; died at sea on the U. S. A. Transport *Logan*, August 9, aged 76.

Joseph F. Robertson, M.D. Columbus, Ohio, Medical College, 1881; a Fellow of the American Medical Association, and a practitioner of Steubenville, Ohio, for thirty-five years; died at his home in that city, August 17, from septicemia, aged 62.

Cyrus Ernest Hoover, M.D. Ensworth Medical College, St. Joseph, Mo., 1886; a Fellow of the American Medical Association; and a member of the Medical Society of the Missouri Valley; local surgeon at Hamburg, Iowa, for the Burlington System; died at his home in Hamburg, August 21, aged 56.

William Edward Dillingham, M.D. Denver and Gross Medical College, Denver, Colo., 1903; of Mead, Colo.; while crossing the Mummy Mountains into Estes Park, Colo., August 19, was struck by lightning and instantly killed, aged 35.

William Henry Harrison Gable, M.D. Rush Medical College, 1879; for many years a practitioner of Osage, Iowa; and for four years state physician of the Maccabees; died at the home of his daughter in Boise City, Idaho, August 14, aged 73.

Charles H. Bacon, M.D. Northwestern University Medical School (Chicago Medical College), 1862; surgeon of volunteers during the Civil War; a resident of Lockport, Ill., since 1852; died at his home in that city, August 26, aged 80.

Charles Moman Johnston, M.D. Rush Medical College, 1914; of Idaho Falls, Idaho; formerly assistant in pathology at the Michael Reese Hospital, Chicago; died in that institution, August 15, from typhoid fever, aged 29.

Westley Rogers Wales, M.D. Jefferson Medical College, 1891; a member of the board of health of Cape May, N. J., and formerly physician of Atlantic County, N. J.; died in a sanatorium in Atlantic City, August 11, aged 45.

Frederick F. Chaffee, M.D. New York University, New York City, 1877; a member of the Vermont State Medical Society and Illinois State Medical Society; died at his home in Chicago, August 17, from nephritis, aged 59.

Charley Marion Cunningham, M.D. Starling-Ohio Medical College, Columbus, Ohio, 1909; formerly a practitioner of West Mansfield, Ohio; died in his apartment in Rasacca, Ohio, August 14, from heart disease, aged 32.

Daniel Campbell Rose, M.D. Harvard Medical School, 1869; for thirty-six years town and county health physician of Stoughton and Norfolk County, Mass.; died at his home in Stoughton, August 13, aged 76.

Leonard T. Whaley, M.D. University of Louisville, Ky., 1912; of Winslow, Ind.; was burned to death under his overturned automobile, August 13, while on his way home from the Huntingburg fair; aged 28.

Andrew C. Sheldon, M.D. Cleveland University of Medicine and Surgery, 1876; formerly a practitioner of Des Moines, Iowa; died at his home in Salt Lake City, Utah, August 23, aged 73.

Benjamin Dorr Colby, M.D. Rush Medical College, 1884; a member of the Illinois State Medical Society; died at his home in Austin, Chicago, August 14, from cerebral hemorrhage, aged 64.

Alvin Snyder, M.D. Missouri Medical College, St. Louis, 1873; for forty years a practitioner of Seneca, Kan.; died at his home in that city, August 23, from cerebral hemorrhage, aged 67.

Elmore Ferdinand Arnold, M.D. New York University, New York City, 1885; for many years a practitioner of New York City; died at his home in Londonderry, Vt., August 13, aged 55.

Gwynne Page Harrison, M.D. University College of Medicine, Richmond, Va., 1901; of Blair, W. Va.; was struck by a Chesapeake and Ohio train, August 12, and instantly killed, aged 34.

Frederick Bradford Mitchell, M.D. Wisconsin College of Physicians and Surgeons, 1904; died at his home in Withee, Wis., August 3, from disease of the liver, aged 46.

Alva E. Lyle, M.D. Washington University, St. Louis, 1873; a member of the Missouri State Medical Association; died at his home in Butler, Mo., August 6, aged 66.

Adams Quincy Baird (license, Indiana, 1897); for many years a practitioner of Shelbyville, Ind.; died at his home, August 11, aged 78.

John Lake Roberts, M.D. Atlanta, Ga., Medical College, 1894; died suddenly at his home in Pavo, Ga., June 11, aged 45.

Mark W. Coffee, M.D. Southern Medical College, Atlanta, Ga., 1882; died at his home in Rochelle, Ga., June 30, aged 71.

Ransom F. Rowley, M.D. University of Buffalo, N. Y., 1884; died at his home in Portville, N. Y., August 6, aged 56.

The Propaganda for Reform

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

DIGALEN OMITTED FROM N. N. R.

Report of the Council on Pharmacy and Chemistry

Digalen is a proprietary said to contain a soluble form (digitoxinum solubile Cloetta) of digitoxin, the chief active principle of digitalis. This preparation was accepted[1] by the Council in 1909 for inclusion in New and Nonofficial Remedies. The Council had not at that time determined whether Digalen contained "soluble amorphous digitoxin," as claimed, or not. The product was accepted merely as a standardized soluble and fairly stable digitalis preparation.

After the acceptance of Digalen, the therapeutic claims made for it by the manufacturers increased in extravagance. Meanwhile, evidence was brought forward by various independent investigators which tended not only to show that these therapeutic claims were unfounded, but also to discredit the claim that Digalen contained a principle chemically identical with digitoxin. In view of the obscurity of the whole subject of the chemistry of the digitalis principles, the latter claim (that Digalen was a solution of "amorphous digitoxin") had been an academic issue at the time of the acceptance of the product. When, however, the manufacturers of Digalen sought to mislead physicians by increased and unwarranted therapeutic claims, the Council felt that investigation of the whole matter was imperatively demanded to decide whether or not Digalen should be retained in N. N. R.

The questions at issue were: (1) the presence in Digalen of "amorphous digitoxin"; (2) the constancy of composition and reliability of action of Digalen, and (3) the claim that it causes less gastric disturbance than digitoxin. No satisfactory proof has yet been offered that Digalen contains "amorphous digitoxin." The mass of evidence tends to show that Digalen is not constant in composition or reliable in action, and that, when given in doses corresponding in therapeutic activity, Digalen causes quite as much gastric disturbance as the official galenical preparations of digitalis.

The outcome of protracted negotiations between the Council and the Hoffmann-La Roche Chemical Works may be summed up as follows: 1. The manufacturers promise to hold in abeyance the claim regarding the presence of "amorphous digitoxin." 2. They refuse to concede the variable composition of Digalen. 3. They reassert the claim that Digalen is superior to other digitalis products with respect to liability to cause gastric irritation and consequent vomiting.

In view of the unsatisfactory character of the reply on the second and third points, the Council voted that Digalen be omitted from N. N. R. and that publication of the report on Digalen which appears below, be authorized, as well as of the two reports[2] (A and B) referred to therein.

W. A. PUCKNER, Secretary.

Referee's Report on Digalen

Because of persistent conflict with Rule 6 (unwarranted therapeutic claims) and Rule 1 (composition) it is recommended that Digalen be omitted from New and Nonofficial Remedies. Also that a copy of the report be sent to the manufacturers, and that publication of this report and the two previous reports submitted to the Council be authorized.

The nature of the problems involved necessitates a somewhat extended discussion of the subject.

Digalen (liquid) is said to contain 1 part of soluble amorphous digitoxin Cloetta in 1,000 parts of glycerin and

1. THE JOURNAL A. M. A., Sept. 11, 1909, p. 869.

2. These reports (A, first report on Digalen and B, examination of Digalen Tablets) will be published in the 1914 Annual Council Reports. A reprint of the entire matter dealing with the rejection of Digalen will be sent on receipt of a two-cent stamp.

1,600 parts of water with 7.5 per cent. of alcohol. One c.c. is said to contain 0.0003 gm. of the amorphous digitoxin.

Digalen was accepted by the Council[3] and the following footnote was appended to the description in New and Non-official Remedies:

"The Council has not determined whether digalen contains 'soluble amorphous digitoxin' or not, but accepts it simply as a soluble digitalis preparation."

Tablets of Digalen were accepted by the Council as a dosage form of Digalen. Each tablet is said to represent 0.5 c.c. (eight minims) of Digalen (liquid).

One of the principal considerations which led the Council to accept Digalen was that it was regarded as affording a fairly constant and stable preparation of digitalis suitable for intravenous administration; if Digalen is not fairly stable and of fairly constant composition it has no obvious advantage over an active soluble digitalis preparation, such as digitalein.

The evidence now at hand seems to show: 1. Digalen is not of constant composition or activity. 2. The manufacturers, or their agents, continue to make misleading statements. 3. It is merely a solution of certain digitalis principles, probably of digitalein mainly, in impure form.

COMPOSITION

Cloetta[4] prepared a soluble amorphous substance which he called "Digitoxinum solubile Cloetta," but no information concerning the method of preparation has been published.

Cloetta reported the result of an elementary analysis of his product which he compared to the analyses of digitoxin (crystalline) made by Schmiedeberg and by Kiliani, and stated that there could be no doubt concerning the chemical identity of the two substances.

Kiliani[5] characterized as preposterous, Cloetta's claim that the active constituent of Digalen is chemically identical with digitoxin and stated that Digalen was merely an impure digitalein. Kiliani has recently reiterated the statement that the so-called "amorphous digitoxin" is not identical with Digitoxin[6]

Cloetta's failure to publish his method of preparing Digalen places an additional burden of proof on him (or the manufacturers of Digalen), concerning the identity of the product, and in the face of Kiliani's denial of the correctness of Cloetta's contention we must have strong corroborative evidence of Cloetta's claim before we can accept it as being established.

The difficulties of dealing with the chemistry of digitalis are so well known that they hardly require further mention here, but under the circumstances Cloetta cannot be considered as being wholly unprejudiced, and, while the same might perhaps, be said of Kiliani, such evidence as can be deduced tends strongly to support Kiliani's view, and to disprove the contention of Cloetta.

There is much confusion regarding the names which have been applied to the various principles obtained from digitalis, and while it is undesirable that an established name should be given to a newly discovered principle, one might overlook this if no effort were made to associate the therapeutic actions of the two substances to an extent which the truth did not justify.

While the Council at that time did not challenge the existence of "amorphous digitoxin" and made no attempt to determine the identity with digitoxin of the substance forming the basis of Digalen, the manufacturers of Digalen have sought to show that Digalen and digitoxin were identical so far as their therapeutic actions were concerned, but that Digalen lacked the disadvantages of digitoxin. What was a purely academic question when the acceptance of Digalen was under discussion by the Council becomes a matter of very great practical importance when the manufacturers of Digalen seek to mislead the physician by these claims.

3. THE JOURNAL A. M. A., Sept. 11, 1909, p. 869.
4. Cloetta: München. med. Wchnschr., 1904, No. 33.
5. Kiliani: München. med. Wchnschr., 1907, p. 886.
6. Kiliani: Am. Jour. Pharm., 1913, lxxxv, p. 224.

The evidence which lends support to the view that Digalen and digitoxin are wholly dissimilar may be summarized as follows: Digalen differs greatly in its physical properties from digitoxin and in certain of its physiologic actions, as the manufacturers themselves state, Digalen being amorphous, and soluble in water, while digitoxin is crystalline and insoluble in water. The manufacturers state that Digalen differs from digitoxin in certain of its physiologic actions, but the two substances do indeed, differ far more than they admit.

Cloetta and the manufacturers of Digalen lay especial stress on the claim that Digalen is cumulative to a far less extent than digitoxin, and that it has far less tendency to cause gastric disturbance than the latter. The first of these claims is true; the second is the very opposite of the truth, as we shall show.

We know nothing of the structure of any of the digitalis principles, and even though one were to admit (purely for the sake of argument) that Digalen and digitoxin were chemical isomers, that fact could not be taken to lend any support to the contention that the two substances were identical, in the face of the established fact that they differ physically and physiologically in nearly every particular, and agree only in that they both cause standstill of the heart in the same way—an action possessed also by so dissimilar a substance as barium.

The manufacturers of Digalen support the claim of the identity of their product with digitoxin by stating that "Digalen is a solution of the most active glucoside of digitalis."[7] Of course, it is very generally admitted that digitoxin is the most active principle of digitalis, though there is some question concerning its glucosidal nature.

Digalen is in fact far less active than digitoxin, as has been shown by a number of independent observers* (Worth Hale, 1910; Hatcher and Brody, 1910; Neave, 1907; Miller, 1908; the referee; Weis, 1912).

The essential fact which appears from the investigation of Weis is that *Digalen did not behave like digitoxin in any case.*

Hale also found that Digalen gave atypical actions in which the effects on the central nervous system became prominent. The referee can corroborate these observations of Hale's on frogs, but the convulsive symptoms were prominent with some specimens of Digalen on mammals, though not with others, the more recent specimens of the preparation showing the action prominently.

The results of all these biologic tests, as well as of the physical tests made by Weis, certainly lend no support to the contention of Cloetta that the potent constituent of Digalen is identical with digitoxin, but, on the contrary, they show conclusively that the two substances differ widely in many essentials, and the continued claim of the manufacturers that the "amorphous digitoxin" said to be contained in Digalen is the same as digitoxin, or that it is the most active glucosid of digitalis, can be considered only as misleading, and therefore in conflict with the rules of the Council.

CONSTANCY OF COMPOSITION AND ACTIVITY

The manufacturers of Digalen continue to claim that it is of constant and uniform activity," and they imply this even when they do not state it in those words; for example, a substance cannot be considered reliable if it is variable in activity, "Digalen is Absolutely *Reliable.* It is *standardized* and consequently *always uniform.* It *does not produce gastric disturbances.*"

That the foregoing is absolutely untrue can be shown abundantly. Hale[13] found Digalen not to be uniformly stable; Weis[14] found very different degrees of activity for Digalen in the liquid and tablet forms, the tablets being but one-third as active as the liquid, and the referee found

* Owing to lack of space a portion of the report is here omitted. A detailed discussion of these results is contained in the full report, contained in the reprint.

7. Clinical Suggestions and Reports, December, 1912, p. 24.
14. Advertisement Brit. Med. Jour., April 26, 1913.
15. Hale: Hyg. Lab. Bull., 74.

very great variations in the activity of different specimens of Digalen, one specimen being almost inert. The results obtained by Miller show that Digalen is sometimes very slightly active, or not at all so.

The foregoing citations show conclusively that Digalen is not of uniform activity. When *reliability* is claimed for Digalen in contrast to the known variability of digitalis, it must be considered as tantamount to the claim that Digalen is not subject to such variability and it must be held that the manufacturers make misleading statements when they assert that Digalen is absolutely reliable.

The manufacturers claim that Digalen does not produce gastric disturbances (see advertisement cited[21]).

It is quite true that when small doses of Digalen are used therapeutically it fails to produce gastric disturbances because it is of such slight activity, as previously stated, but when it is used in amounts which correspond in activity to such doses of the ordinary galenical preparations of digitalis as commonly cause nausea and vomiting it does cause gastric disturbances quite as readily as the latter.

Among the clinicians who have found that Digalen causes gastric disturbances may be cited: Veiel,[16] Mueller,[17] Eichhorst[18] and Teichmann.[19]

Eggleston and Hatcher[20] compared the emetic and cardiac activity of Digalen and numerous other digitalis bodies and preparations and found that the emetic activity of Digalen was decidedly greater in proportion to its cardiac (or therapeutic) action than was that of digitalis or digitoxin.

In the absence of any evidence to controvert this clinical and experimental evidence, the continued claim that Digalen does not disturb the stomach must be looked on as deliberate misrepresentation.

MISLEADING THERAPEUTIC CLAIMS

The recommendation that Digalen be dismissed from N. N. R. is made with the full appreciation of the fact that the manufacturers of Digalen and their agents have repeatedly stated that they desired to comply with the rules of the Council, and that they have withdrawn several statements to which the Council has taken exception, but the fact remains that despite these reiterations the advertisements of Digalen continue to embody statements which the Council can only consider misleading.

The Council believes that the following advertisements constitute gross therapeutic exaggerations:

"Digalen a sheet anchor in pneumonia; a strong support to the heart in this deadliest of infectious diseases among adults. The prompt action of Digalen, by intravenous or intramuscular injection makes it possible to save lives which might be otherwise hopelessly lost. The best digitalis preparation which we have at the present time."[21]

"*The* digitalis for children. Because its dosage can be controlled. Endorsed by pediatrists everywhere."[22]

"The myocarditis of Tuberculosis so frequently encountered, especially in the advanced stage of the disease, may be controlled with the aid of Digalen. The standard digitalis preparation."[23]

"Digalen is Absolutely *Reliable*. It is *standardized* and consequently *always uniform*. It *does not produce gastric disturbances*."[24]

Digalen is not a sheet anchor in pneumonia, for there is no drug deserving such a title. Digalen has no action which other digitalis preparations lack, and cannot save lives otherwise hopelessly lost. The dosage of Digalen cannot be controlled any better than that of other digitalis preparations, since its activity is variable. We cannot control the myocarditis of advanced tuberculosis by this, or any other means.

CLAIMED SUPERIORITY

Various digitalis principles, including digitoxin, digitalin (true) and digitalein, have been known for many years. Therapeutically they have been found wanting and there appears to be no basis for the continued claim that Digalen has any superiority over these several digitalis principles. On the contrary, the evidence is accumulating that Digalen has no advantage in any particular over a solution of digitalein, and misleading claims of the manufacturers and their agents certainly interfere with the formation of that calm and unbiased opinion on the part of the general practitioner, which, when applied to the non-proprietary digitalis principles has caused them to fall into disuse.

16. Veiel: München. med. Wchnschr., 1906, liii, 2140.
17. Mueller: München. med. Wchnschr., 1909, lvi, 904.
18. Eichhorst: Deutsch. med. Wchnschr., 1905, xxxi, 49.
19. Teichmann: Therap. d. Gegenw., 1907, xlviii, 199.
20. Eggleston, Cary and Hatcher, Robert, A.: The Emetic Action of the Digitalis Bodies, THE JOURNAL A. M. A., Feb. 15, 1913, p. 499.
21. Advertisement in Am. Med., January and February, 1913.
22. Advertisement in Merck's Arch., April, 1913.
23. South. Medical Journal, January to May, 1913, inclusive.
24. Advertisement in Brit. Med. Jour., April 26, 1913.

Queries and Minor Notes

ANONYMOUS COMMUNICATIONS and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted, on request.

WATER-GLASS IN THE PRESERVATION OF EGGS

To the Editor:—In THE JOURNAL, Aug. 29, 1914, p. 796, C. W. L., Denver, asks for the comparative and practical value of water-glass in the preservation of eggs. During August last year I put down about twelve dozen eggs in a solution of water-glass, one part to ten parts of water. The eggs were used during the winter and by some means half a dozen were left in the jar until this August, when I discovered them on making preparations to put down more. They were in a perfect state of preservation, having remained in the solution twelve months. The water should be sterilized and the eggs strictly fresh when put down, and I doubt if there is any limit to the time they will remain fresh.

B. F. METCALFE, M.D., Greenville, Ohio.

VALUE OF VON PIRQUET REACTION IN ADULTS—RELIABILITY OF BASS-WATKINS TEST

To the Editor:—1. When the von Pirquet reaction for tuberculosis is positively positive in an adult female, is that reaction pathognomonic of tuberculosis either active or latent?

2. Is the Bass-Watkins test for typhoid fever as reliable as the old Widal reaction?

S. W. DOUGLAS, M.D., Eudora, Ark.

ANSWER.—1. A positive result from the von Pirquet reaction indicates the presence of a tuberculous focus but does not distinguish between active and latent tuberculosis. This reaction is given by the majority of adults, and hence is of little value as a test in adults.

2. Yes.

ALCOHOL IN MILK AND URINE

To the Editor:—1. Please give a simple qualitative and quantitative test for the presence of alcohol in milk.

2. What is the reliability and specificity of Anstie's test for alcohol in urine?

R. K.

ANSWER.—1. Probably the best method is to distil the milk, then after adding sodium hydroxid to the distillate, to redistil and test the second distillate obtained for alcohol according to established tests such as the iodoform test or benzoyl-ethyl ester test, etc. It is asserted that the method of E. de Stoecklin (*Compt. rend., Acad. d. sc.*, 1910, CL, 43; abstr., *Chemical Abstracts*, 1910, iv, 886) will detect alcohol in 4 drops of a solution of a strength of 1 part alcohol in 10,000. For the quantitative test the specific gravity of the distillate obtained quantitatively as described above should be determined and the percentage of alcohol in a known amount of milk calculated therefrom (See Bull. 107, Bureau of Chemistry, U. S. Dept. of Agric.).

2. We have no definite information regarding the reliability and specificity of Anstie's reaction. Merck's Report for 1900, p. 112, states that the emerald green color signifies the presence of alcohol *in toxic quantities*. In 1877 F. C. Hewett (*Proc. Am. Pharm. Assn.*, 1877, xxv, 275) called attention to "the fallacy of Anstie's bichromate of potassium test for alcohol in urine, unless the latter be first distilled, the fallacy consisting in the reduction into the green oxid, not by alcohol singly, but by some agent present in the urine of persons who are total abstainers from alcohol. If the test be applied to the distillate in case of the alcohol having been taken in sufficient quantity to permit of its excretion in an unchanged form, the test will hold good, but not otherwise."

BLOOD DETERMINATION OF VARIETIES OF MAN

To the Editor:—Is there any known and positive method of determining whether blood is that of a white person or of a negro?

E. C. DUNNING, M.D., Cassopolis, Mich.

ANSWER.—No.

Medical Education and State Boards of Registration

COMING EXAMINATIONS

ALBERTA: Edmonton, September 15. Registrar, Dr. Cecil E. Race, University of Alberta, Edmonton.
COLORADO: Denver, October 6. Sec., Dr. David A. Strickler, Empire Bldg., Denver.
GEORGIA: Atlanta, October 13-15. Sec., Dr. C. T. Nolan, Marietta.
IDAHO: Wallace, October 6. Sec., Dr. John F. Schmershall, Jerome.
ILLINOIS: Chicago, October 6-8. Sec., Dr. C. St. Clair Drake, Springfield.
IOWA: Des Moines, September 10-12. Sec., Dr. Guilford H. Sumner, Capitol Bldg., Des Moines.
KANSAS: Topeka, October 13-15. Sec., Dr. H. A. Dykes, Lehanon.
MASSACHUSETTS: Boston, September 8-10. Sec., Dr. Walter P. Bowers, State House, Boston.
MICHIGAN: Lansing, October 13-15. Sec., Dr. Beverley D. Harison, 504 Washington Arcade, Detroit.
MINNESOTA: Minneapolis, October 6-9. Sec., Dr. Thomas McDavitt, Lowry Bldg., St. Paul.
MISSOURI: Kansas City, September 28-30. Sec., Dr. J. A. B. Adcock, State House, Jefferson City.
MONTANA: Helena, October 6. Sec., Dr. William C. Riddell, Helena.
NEW YORK: September 22-25. Chief of Examination Division, Mr. Harlan H. Horner, Department of Education, Albany.
OKLAHOMA: Muskogee, October 6-8. Sec., Dr. John W. Duke, Guthrie.
RHODE ISLAND: Providence, October 1-2. Sec., Dr. Gardner T. Swarts, State House, Providence.
WEST VIRGINIA: Clarksburg, October 13. Sec., Dr. S. L. Jepson, 81 Twelfth St., Wheeling.

Kansas February Report

Dr. H. A. Dykes, secretary of the Kansas State Board of Medical Registration and Examination, reports the written examination held at Topeka, Feb. 14, 1914. The total number of subjects examined in was 10; total number of questions asked, 100; percentage required to pass was 75. The total number of candidates examined was 11, of whom 10 passed and 1 failed. Ten candidates were licensed through reciprocity. The following colleges were represented:

PASSED

College	Year Grad.	Per Cent.
Yale University	(1912)	77
Hering Medical College	(1912)	75
College of Physicians and Surgeons, Kansas City, Kan.	(1900)	76
Harvard University	(1908)	82
Kansas City Medical College	(1897)	81
University Medical College, Kansas City, Mo.	(1902)	87
Jefferson Medical College	(1913)	79
University of Tennessee	(1913)	77, 79
University of Edinburg, Scotland	(1912)	82

FAILED

Meharry Medical College	(1913)	*

* No grade given.

LICENSED THROUGH RECIPROCITY

College	Year Grad.	Reciprocity with
University of Colorado	(1912)	Colorado
College of Physicians and Surgeons, Chicago	(1906)	Illinois
Kentucky School of Medicine	(1902)	Kentucky
Ensworth Medical College	(1910)	Nebraska
Univ. Medical College, Kansas City (1907)	(1911)	Missouri
Washington University	(1911)	Missouri
John A. Creighton Medical College	(1912)	Nebraska
Jefferson Medical College	(1889)	New Mexico

Utah April Report

Dr. G. H. Harding, secretary of the Utah State Board of Medical Examiners, reports the written examination held at Salt Lake City, April 2-3, 1914. The total number of subjects examined in was 19; total number of questions asked, 100; percentage required to pass, 75. The total number of candidates examined was 8, of whom 5 passed, including 1 osteopath, and 3 failed, including 1 osteopath; for 1 candidate the name of the college is in doubt. Seven candidates were licensed through reciprocity. The following colleges were represented:

PASSED

College	Year Grad.	Per Cent.
Denver and Gross College of Medicine	(1905)	80.7
Gross College of Medicine	(1900)	81
University of Pennsylvania	(1911)	85.2
Vanderbilt University	(1900)	82.5

FAILED

St. Louis University	(1908)	71.1

LICENSED THROUGH RECIPROCITY

College	Year Grad.	Reciprocity with
Medical College of Indiana	(1905)	Indiana
Ensworth Medical College	(1913)	Missouri
University Medical College, Kansas City	(1906)	Missouri
John A. Creighton Medical College (1907)	Iowa (1913)	Nebraska
Ohio-Miami Medical College	(1910)	Ohio
University of Pennsylvania	(1912)	Penna.

Book Notices

DIE KRANKHEITEN DES NEUGEBORENEN. Von Dr. August Ritter von Reuss, Assistant an der Universitäts-Kinderklinik. Spezieller Teil, Enzyklopaedie der klinischen Medizin. Herausgegeben von L. Langstein, C. von Noorden und others. Paper. Price, 22 marks. Pp. 550, with 90 illustrations. Berlin: Julius Springer, 1914.

The thoroughness of this book, its detailed references to the literature, and its mass of detailed information regarding all of the unusual conditions of the new-born make it a splendid reference book. The chapter on the feeding of the new-born is especially good in its recital of the many difficulties that stand in the way of successful nursing and the best way to overcome them. The chapter on breast injuries and diseases of the alimentary and respiratory tracts is very complete. The same can be said of practically all of the other chapters. All the way through one sees the work of an author who has mastered his subject and presented it in a pleasing objective way. The illustrations greatly enhance the value of the book in that they show at a glance unusual conditions which one can understand much more easily by an illustration than by a long description. The book can be very highly recommended to all interested.

BEDSIDE HEMATOLOGY. An Introduction to the Clinical Study of the So-Called Blood Diseases and of Allied Disorders. By Gordon R. Ward, M.D. Cloth. Price, $3.50 net. Pp. 394, with 42 illustrations. Philadelphia: W. B. Saunders Company, 1914.

Two admirable qualities characterize this work and form a reason for recommending it highly. The first is its practical character. The work deals with clinical relations and facts and as little as possible with questions of pathology. No time is wasted in the description of unnecessary technic for examinations; indeed, the space given to the examination of blood appears at first to be meager, but the reader will find sufficient details for the practical processes. The greater part of the work is devoted to the description of the different forms of disease of the blood-making organs, and incidentally to the changes in the circulating blood. The second point of advantage is the systematic classification. In an introductory chapter the author discusses the question of classification, and while admitting that his scheme is open to various objections and to the charge of inconsistency, he develops an arrangement which is of great aid to the reader. The first disease that is discussed is lymphemia. The symptomatology of this disease is thoroughly worked out and affords a basis for subsequent comparison with the other forms of blood diseases. In reference to etiology, a possible gastro-intestinal origin is suggested, and this is more distinctly recognized with reference to the general forms of anemia. Addisonian anemia or pernicious anemia is said to be almost certainly due to the activities of a micro-organism. The author says: "The exciting cause is the growth and development of the causal organism. There is evidence to suggest this is a denizen of the intestinal tract, perhaps of the whole alimentary canal." The book is well illustrated with numerous figures and especially two colored plates.

ROTH'S KLINISCHE TERMINOLOGIE. Zusammenstellung der in der Medizin gebräuchlichen technischen Ausdrücke mit Erklärung ihrer Bedeutung und Abteilung. Bearbeitet von Dr. E. Oberndörffer. Eighth Edition. Cloth. Price, 12 marks. Pp. 484. Leipsic: Georg Thieme, 1914.

This is a new and greatly modified edition of a work little known to American physicians. Naturally a dictionary in a foreign language will be of little service to the English-speaking physician even when it includes, as does the present work, a good collection of the medical terms of German origin. The work included at first only such terms as were used in the field of clinical medicine, terms relating to materia medica, chemistry and allied topics being omitted. These defects have been remedied in the present edition with the result of increasing the size of the book by about half. Terms derived from or current in other languages than German are defined, so that the usefulness of the work is materi-

ally increased. This work may be confidently recommended to German readers, and we can only second the hope expressed by the reviser that as Roth's "Clinical Terminology" has maintained its usefulness for thirty-six years, the work in its new form will find many friends.

LEITFADEN DER SÄUGLINGSKRANKHEITEN FÜR STUDIERENDE UND ÄERZTE. Von Dr. Walter Birk, Privatdozenten für Kinderheilkunde an der Universität Kiel. Paper. Price 4.80 marks. Pp. 256, with twenty-five illustrations. Bonn: A. Marcus & E. Webers, 1914.

This little book is a reliable and up-to-date presentation of the subject of diseases of infancy. Inasmuch as pediatrics has largely to do with the infant it naturally follows that so concise a book contains little if anything that is not found in the larger standard text-books on diseases of children.

MENINGOCOCCUS MENINGITIS. By Henry Heiman, M.D., Professor of Pediatrics, New York Polyclinic School and Hospital, and Samuel Feldstein, M.D., Lecturer on Pediatrics, New York Polyclinic School and Hospital. With Introduction by Henry Koplik, M.D., Chief of Service, Mount Sinai Hospital, New York. Cloth. Price, $2.50. Pp. 313, with 39 illustrations. Philadelphia: J. B. Lippincott Company, 1913.

This monograph is founded on the study of cases occurring in the clinic of Henry Koplik at the Mount Sinai Hospital. In his introduction Dr. Koplik calls attention to the fact that in spite of the value of the Flexner serum the results of the disease on those who recover, especially when the patient is less than 1 year of age, is still extremely serious. The physician needs in coping with this disease every aid to diagnosis and treatment available. The authors have added to their personal experience a review of the literature and have produced a satisfactory account of the disease. The laboratory technic described is such as the practitioner can expect to make use of in his daily work; the technic of spinal puncture and injection is given in a way that may be easily followed. The diagnostic aids to be derived from an examination of the spinal fluid are fully described. These are well summed up in a table adapted from Pfaundler and Schlossman giving in parallel columns the findings in various diseases. The book is well illustrated.

TUBERCULOSIS: ITS CAUSE, CURE AND PREVENTION. A Revised Edition of the "Great White Plague." (A Book for Laymen.) By Edward O. Otis, M.D., Professor of Pulmonary Diseases, Tufts College Medical School. Cloth. Price, $1.25 net. Pp. 326, with illustrations. New York: Thomas Y. Crowell Company, 1914.

The author does not find that in the five years that have elapsed since his book was first issued under the title "The Great White Plague" any startling discovery has been made regarding either the nature or the cure of tuberculosis. Nor have the methods of fighting the disease been materially changed. The fight is more intense and is carried on with greater resources. The disease is steadily decreasing, and past success brings courage and hope. In the revision the form and substance of the book have been retained with only such changes as increasing knowledge have rendered necessary to bring it up to date.

Why Progress is Slow.—In one of his aphorisms Wundt says that "men think very little and very seldom." The truth of this dictum is indisputable. . . . Herbert Spencer walked about London, notebook in hand, listening to and writing down the matter of the conversation of passers-by. He found it to be of the most ordinary character, chiefly personal, such as "And how was Jemmy when you left him?" or, "She never gives more than tenpence a yard for it," etc. And action, like thought, is often of the simplest kind; however difficult at first to acquire, it has become an easy and self-sustaining reflex. When active thought or energy of a new kind is carried on for a long time or under stress people break down under it; the work can be done for only short periods. It is the custom to point to the great age to which scientific and other very busy men live; but when they do it is because they have as a rule an occupation which they are fitted to carry on without strain.—T. Claye Shaw, *Lancet*, London.

Miscellany

Ready-Made Ligature

The surgical knot illustrated is made on the forceps, the tip of the forceps being slipped through the superposed loops C and D. The loose knot is then slipped back on the forceps nearly to the handle and the vessel is clamped with the forceps as usual. Then the knot is slipped over the tip of the forceps and on the vessel and the ends drawn tight. No further tying is required. The knot was devised by M. G. Wunderlich of Guatemala, and the various steps of its application are illustrated in the *Cronica Medica* of Lima, Peru, 1914, xxxi, 205.

Ready-Made Surgical Knot

Ethical Advertising—Hints to Certain Medical Journals

Press dispatches indicate that at the Toronto meeting of the Associated Advertising Clubs of America, the keynote of most of the meetings of the different sections was devoted to the consideration of a higher standard of ethics among newspaper publishers and advertising men. It was stated that one meeting discussed the formation of a publishers' organization with a "clean page" as a standard. Most of the speakers took the position that the publishers could no longer deny their responsibility in safeguarding their readers from false advertisements.

While the medical journals should be the first to clean their pages, in this respect it is, nevertheless, a fact that some of the sheets going to doctors' offices throughout the United States carry advertising of the most untruthful and dishonest type. Responsibility of the medical journals' editors cannot be denied. More than that, their responsibility is much greater than that of an ordinary newspaper man, who may be excused from knowing a great deal about the ethics of the medical matter appearing in his pages.

The writer has rarely ever had the heart to criticize the daily newspapers for carrying "Pennyroyal Pills," "Ladies' Safe and Sure," "Peruna," etc., when his desk is covered up with medical journals advertising a delectable line of fakes. We should not forget that physicians may be influenced to use some of the worthless stuff they read about. Oregon has gone so far through the Oregon Social Hygiene Society to influence the legislature to pass an act prohibiting the publication of any advertisements "intended to imply that the advertiser will restore manly vigor, treat or cure lost manhood, stricture, gonorrhea, chronic discharges, gleet, varicocele or syphilis." We all know this is a sensible thing to do. . . . We should not wait for the people to regulate our affairs. The next step of the Oregon legislature would be to prohibit the advertising of fake remedies in medical journals. This would be, and properly, a stinging rebuke to the medical editor and it should not be necessary. Most of them know when their stuff is not acceptable, but the power to regulate it immediately lies with the individual physician. If he should ask the publisher to discontinue his dishonest advertisements that would settle the matter.—*Jour. Oklahoma State Med. Assn.*

The Influence of Schoolbooks on the Eyesight

The study of this question has been made by a committee of the British Association for the Advancement of Science. The report is published in the Proceedings of the eighty-third meeting of the British Association for the Advancement of Science (London, 1914, p. 268). The committee reports that, while attention is given in British schools to the detection and correction of visual defects in schoolchildren, the influence of schoolbooks on the vision is practically ignored. The committee believes that the influence of books on the immature eye of the child is an important

one, and that, hygienically, the later children begin to read from books the better. The suggestion is made that little, if anything would be lost educationally by postponing the use of books in school at least until pupils have reached the age of 7. Oral instruction, wall-charts, blackboards, large pictures and other objects easily seen at a distance are recommended as substitutes for books in school.

The committee suggests a standard of book production, the adoption of which by educational authorities would render unprofitable the publication of books of a lower standard.

Among the hygienic requirements to which schoolbooks should conform the following are enumerated:

The surface of the paper should be neither glossy nor soft. The print of one side should not show through from the other, and the impression of the type on one side should not affect the evenness of the surface of the opposite side.

Books should be stitched with thread, so as to open flat. In books clipped from side to side with wire staples, the convex surface of the page gives rise to eye-strain.

For young children, illustrations from pen and ink drawings are preferable to halftones from photographs and wash drawings. The lettering of diagrams should be large enough to be read easily. Glazed paper may be used for halftone illustrations; it should never be employed for the text.

The ink should be a good black, and evenly distributed. The use of colored inks for reading-matter is strongly deprecated.

Worn stereotypes should be discarded. The ordinary text of schoolbooks intended for continuous reading should not be printed in double columns.

In regard to type faces, the committee expresses no preference between "modern" and "old style," but insists on a clean cut, well-defined type, neither too heavy nor to thin, not elongated vertically, and without excessive contrast between the finer and the heavier strokes. The general form of the letters should be broad and square, with a lateral shoulder on each type so that the letters are distinct. Long serifs should be avoided.

The size of type faces is considered the most important factor in the influence of books on vision. It is of the first importance to induce the young reader to keep a sufficient distance between eyes and book. Specimens of type faces considered acceptable for use at various ages are shown in the report. For children under 7, the smallest type presented has a minimum height of face for the short letters of 3.5 mm. (a little over 1/8 inch). The use of type as small as that of the editorial pages of THE JOURNAL is not considered advisable for children under 12.

Very long lines of type necessitate great excursions of the eye and make it difficult to pass from one line to the next. Very short lines demand too frequent a change of direction in the movement of the eyes. A line of 4 inches for the largest type and 3 1/2 inches for the other sizes is recommended. Children 8 years old should not have their reading confined to very short paragraphs.

Good margins are restful to the eye and well worth their slight cost. The width of the outer edge in any schoolbook page should not be less than half and inch, and the width of the inner edge not less than three-eighths of an inch.

Copies of exercises, examples and questions produced by the hektograph or other multiplying process should be clear and legible.

It is better to multiply maps than to put much detail into one.

The Labeling Vice

Human vanity eyes all versatility with hostile suspicion. Most of us cannot do even one thing well, and we seldom have sportsmanship enough to applaud the man who excels at two or three. We prefer to label him with the first one of his achievements that attracts our notice. As for anything else he may do, we look it over and then firmly declare "None genuine without the original label."—R. H. Schauffler, *Century*.

Medicolegal

Death from Non-Abortive Anesthetic

(*State vs. Tippie (Ohio), 105 N. E. R. 75*)

The Supreme Court of Ohio holds that whoever, with the intent to procure the miscarriage of a woman by the use of an instrument or other means, administers to her a non-abortive drug as an anesthetic preparatory to the use of such instrument or other means of procuring an abortion, and the woman dies in consequence of the administering of such drug before the use of instruments or other means by such person to produce such miscarriage, and it does not appear that such contemplated miscarriage is necessary to preserve her life, or that the procuring of such miscarriage was advised by two physicians to be necessary for that purpose, is guilty of a violation of the provisions of Section 12412 of the Ohio General Code. Under such circumstances every act done and performed in furtherance of such unlawful purpose is an integral part of the whole unlawful transaction, and the fact that death ensues before the final act in the contemplated crime can be accomplished is not a defense to an indictment charging a violation of this section.

If it appears, however, that a non-abortive drug is administered to a woman as an anesthetic to enable a duly authorized and practicing physician fully and carefully to examine into the woman's actual condition for the purpose of determining if it be necessary to produce a miscarriage in order to save her life, and the woman dies from the effect of the drug so administered, and no miscarriage is produced, nor intended to be produced unless the examination discloses that it is necessary to preserve the woman's life, no offense has been committed within the provisions of Section 12412.

Evidence tending to show that no secrecy is maintained in the transaction, that a second physician is called in to administer the anesthetic, that while the woman is in a state of anesthesia the attending physician makes an examination for the purpose of determining whether the fetus is alive or dead, and on such examination does determine that the fetus is still alive, and that it is not necessary to procure a miscarriage in order to preserve the woman's life, and, having so determined, makes no use of any instrument or other means to procure a miscarriage, but immediately desists from further efforts in that direction, and directs that the woman be restored to consciousness, is proper evidence to be admitted for the purpose of showing the absence of criminal intent in administering the anesthetic.

Accident Deemed Cause of Death Notwithstanding Organic Weakness

(*Moon vs. Order of United Commercial Travelers of America (Neb.), 146 N. W. R. 1037*)

The Supreme Court of Nebraska holds that it could be said that the death of the insured in this case was caused by external, bodily injury when, while going up the steps leading into his yard, he accidentally slipped and fell with force and violence, striking his external body near the region of the heart on a large stone with such force as to cause a rupture of the left auricle of his heart, from which he immediately died. The jury were warranted in finding that the accident was the proximate cause of the death, although the condition of the heart and other organs of the body of the assured may have the more readily permitted the rupture, it not having been shown that death would have ensued at the time it did but for the accident. The fact that a person of 50 or 55 years of age would be likely to have a normal hardening of the arteries in parts of the body, which might tend to bring about a rupture of the heart in case of a violent accident of the kind occurred in the instant case, is not sufficient to show that the accident was not the proximate cause of the death of the assured. If insurance is to be defeated because of the fact that the walls of the heart grow thinner by advancing years, or the arteries become sclerosed, or the valves of the heart act improperly, and this condition

is the result of age, then the collection of the insurance money may nearly always be defeated by the effect of increasing years, which change the condition of the assured. The court does not believe this to be the policy of the law.

Proof of Illegal Practice of Medicine

(Hathaway vs. State (Ga.), 81 S. E. R. 260)

The Court of Appeals of Georgia holds that, in a prosecution for practicing medicine illegally, the state is required to prove that the accused, with intent to receive compensation therefor, performed services such as are defined in Section 1683 of the Civil Code of 1910, without registering in the county of his residence as required by Section 1684. The burden is on the state to prove, as a material fact in the case, the residence of the accused as alleged in the indictment; but the prosecution may rely on the failure of the accused to attack prima facie or presumptive proof as to residence which is sufficiently strong to compel the production of affirmative proof in order to rebut it. The court says that, according to the record, the volume of practice done by the accused in this case was exceedingly small. He made a poultice from herbs, which he gathered in the suburbs of Atlanta, and applied it to the arm of the keeper of the hostelry where he was boarding, and he supplied one of the chambermaids with a bottle of "Klondike Kidney Cure," which appeared to have relieved her of a severe case of stomach-ache. The real point in this case was whether the services rendered by the accused were humanitarian on his part, and purely charitable, or whether they were performed with the intent to receive compensation. The evidence in favor of the prosecution on this point was weak and unsatisfactory, but it was sufficient to authorize a verdict of guilty, if the jury believed the witnesses for the state. The court does not think the jury would have been authorized to convict the accused on the complaint of the maid who had "awful" pains in her stomach, and who had her employer to pay the accused 50 cents for the medicine, which "did her good right away," for that showed nothing more than a sale of a patent nostrum. The testimony of the prosecuting witness, however, who, after detailing the services rendered and that he was benefited by the treatment, testified that: "He made some poultices and bandaged them on my arm, and gave me some pills, . . . and for his services we agreed that I should give him credit for $2.50 on his board at my house, which I did. He took the $2.50 on his board," came clearly under the terms of Section 1683 of the Civil Code, and there was positive uncontradicted testimony that the accused had not complied with the requirements of Section 1684. The evidence authorized the verdict of guilty.

Society Proceedings

COMING MEETINGS

Amer. Academy of Ophthal. and Oto-Laryn., Boston, Oct. 19-21.
Amer. Assn. of Obstetricians and Gynecologists, Buffalo, Sept. 15-17.
American Association of Railway Surgeons, Chicago, Oct. 14-16.
American Electro-Therapeutic Association, Battle Creek, Sept. 15-17.
American Roentgen Ray Society, Cleveland, Sept. 9-12.
Association of Military Surgeons of the U. S., Cincinnati, Sept. 29-Oct. 2.
Colorado State Medical Society, Boulder, Sept. 8-10.
Delaware State Medical Society, Wilmington, Oct. 13-14.
Idaho State Medical Association, Boise, Oct. 8-9.
Indiana State Medical Association, Lafayette, Sept. 24-25.
Kentucky State Medical Association, Newport, Sept. 23-25.
Med. Soc. of the Mo. Valley, Des Moines and Colfax, Ia., Sept. 17-19.
Michigan State Medical Society, Lansing, Sept. 11-12.
Minnesota State Medical Association, St. Paul, Sept. 30, Oct. 1-2.
Mississippi Valley Med. Assn., Cincinnati, Oct. 27-29.
Nevada State Medical Association, Reno, Oct. 13-15.
New Mexico Medical Society, Albuquerque, Oct. 5-7.
Oregon State Medical Association, Portland, Sept. 10-11.
Pennsylvania State Medical Society, Pittsburgh, Sept. 21-24.
Utah State Medical Association, Salt Lake City, Sept. 29-30.
Vermont State Medical Society, Rutland, Oct. 8-9.
Virginia Medical Society, Washington, D. C., Oct. 27-30.
Washington State Medical Association, North Yakima, Sept. 21-23.
Wisconsin State Medical Society, Oshkosh, Oct. 7-9.

Current Medical Literature

AMERICAN

Titles marked with an asterisk (*) are abstracted below.

American Journal Diseases of Children

August, VIII, No. 2, pp. 113-184

1 Primary Pulmonary Actinomycosis in a Child Aged Ten, with Post-Mortem Examination. F. Huber and S. Berkowitz, New York.
2 *Casein in Infant-Feeding. A. W. Bosworth and H. I. Bowditch, Boston.
3 Presence of Lactic Acid in the Urine in Cyclic Vomiting of Childhood. F. P. Underhill and H. M. Steele, New Haven, Conn.
4 Clinical Study of Typhoid in Children. H. D. Chapin, New York.
5 *Diagnosis of Whooping-Cough by Complement-Deviation Test. A. Friedlander and E. A. Wagner, Cincinnati.
6 Artificial Cooling of Sick-Rooms. H. Heiman, New York.
7 *Circumcision in Masturbation of Female Infants; Report of Six Cases. R. G. Freeman, New York.
8 Middle-Ear Complications of Measles in Immigrant Children. H. C. Cody, Ellis Island, N. Y.
9 Case of Tuberculous Meningitis Complicated by Influenzal Meningitis. H. K. Faber, New York.
10 Active Immunization against Diphtheria by Means of Von Behring's Vaccine, and the Diphtheria Toxin Skin Reaction. B. S. Veeder, St. Louis.
11 Digestive Disturbances of Artificially Fed Babies. I. M. Snow, Buffalo.

2. **Casein in Infant-Feeding.**—A method is given by the authors for preparing dry powdered paracasein for use in infant-feeding. It is shown that this paracasein is very easily digested and absorbed, and judging from the elimination of creatinin and creatin, it seems possible to maintain normal nitrogen metabolism by its use in infant-feeding. It is shown further that disturbances (fever, toxic symptoms, etc.) do not result from feeding this paracasein in exceptionally large quantities for seven days, even if fed with only the small amount of whey carried in 68 c.c. of 32 per cent. cream.

5. **Diagnosis of Whooping-Cough by Complement-Deviation Test.**—The authors' results lead them to the opinion that the complement-deviation test is of the greatest possible value in the diagnosis at all stages. Eighteen cases tested during the paroxysmal stage gave positive reactions: 3 + in each case. Nine of the cases were in the first week of the cough and 3 early in the second week. In no case did a normal give a positive reaction. This series included several cases of bronchitis. Of the 12 early cases, tested in the catarrhal stage, 11 gave positive reactions, and in each instance the definite whoop appeared later, thus confirming the serologic diagnosis clinically. The one case that gave a negative reaction was tested at the very beginning of the cough. The sister had given a positive test. Two weeks later the child with the negative test began to whoop. The one case giving a positive test that never whooped, occurred in a child with paroxysmal cough and vomiting lasting over a period of four weeks, evidently an atypical pertussis. The technic of the test employed is described in detail.

7. **Circumcision in Masturbation of Female Infants.**—Freeman is convinced that the masturbation of female infants occurs in nervous children, the stimulating cause being adhesions about the clitoris such as exist in practically all female infants. The treatment of this condition by braces alone is palliative and not curative. The only curative treatment is by separation of the adhesions and circumcision, and the result of such operative interference is often satisfactory.

American Journal of Obstetrics and Diseases of Women and Children

August, LXX, No. 440, pp. 173-328

12 *Polypoid Chondrofibroma of the Fallopian Tube, Associated with Tubal Pregnancy. G. W. Outerbridge, Philadelphia.
13 Cesarean Section Necessitated by Pelvic Chondrosarcoma. D. Nathan, Norristown, Pa.
14 Pathogenesis and Differential Diagnosis of Perirenal Abscess Complicating the Post-Partum Period. C. G. Cumston, Geneva, Switzerland.
15 Plea for More Uniform Use of Murphy Button. J. W. Kennedy, Philadelphia.
16 Application of the Ninhydrin Reaction to the Urines and Urine Dialysates of Pregnant Women. L. Berman, New York.

12. **Polypoid Chondrofibroma.**—In a tube removed on account of early tubal pregnancy, Outerbridge found a small, somewhat papillary growth practically filling the lumen just proximal to the placental area. Microscopic examination of the tumor showed this to be a somewhat degenerated fibroma, covered on the surface by tubal epithelium, and containing extensive areas of interstitial hemorrhage, numerous engorged capillary blood-vessels, small areas of fatty degeneration, and an island of hyaline cartilage. No connection between the tumor and the tube wall was demonstrated, although this had undoubtedly existed in the form of a narrow pedicle. The growth appeared to be essentially a fibroma, with a small area of cartilaginous metaplasia, and not an embryonic mixed tumor. Outerbridge suggests that the little tumor, almost blocking the tube lumen near the uterine end, may have been a factor in the arrest of the ovum, and the consequent development of the tubal pregnancy.

American Journal of Physiology, Baltimore

August, XXV, No. 1, pp. 1-147

17 *State of Vasomotor Apparatus in Pneumonia. W. T. Porter and I. Newburgh, Boston.
18 Compensatory Phenomena in Distribution of Blood during Stimulation of Splanchnic Nerve. D. J. Edwards, New York.
19 *Independence of Lobes of Liver. F. K. Bartlett, H. J. Corper and E. R. Long, Chicago.
20 Viscosity of Laked Blood. R. Burton-Opitz, New York.
21 *Vasomotor Center. Effects of Hemorrhage and Reinjection of Blood and Saline Solution. J. D. Pilcher and T. Sollmann, Cleveland.
22 *Id. Effects of Intravenous Infusion of Normal Saline Solution. J. D. Pilcher and T. Sollmann, Cleveland.
23 *Venous Blood-Pressure in Man. D. R. Hooker, Baltimore.
24 Outflow of Blood from Liver as Affected by Variations in Condition of Portal Vein and Hepatic Artery. J. J. R. MacLeod and R. G. Pearce, Cleveland.
25 *Oxygen Pulse and Systolic Discharge. Y. Henderson and A. L. Prince, Boston.
26 Systolic Discharge and Pericardial Volume. Y. Henderson and A. L. Prince, Boston.
27 *Ovarian Extirpation and Vasomotor Irritability. R. G. Hoskins and H. Wheelon, Chicago.
28 Nature and Causes of Respiratory Pressure Variations in Pulmonary Artery. C. J. Wiggers, New York.
29 *Clotting of Blood as Seen with Ultramicroscope. W. H. Howell, Baltimore.

17. **Vasomotor Apparatus in Pneumonia.**—Experimental evidence obtained by Porter and Newburgh proves that the vasomotor center is not impaired in fatal pneumonia.

19. **Independence of Lobes of Liver.**—The authors' experiments show that there is a physiologic independence of the lobes of the liver in dogs, depending on the fact that the blood flowing into the portal vein from each of the smaller veins of the portal system, does not blend diffusely into a common current, but remains individualized to a considerable degree, streaming in thread-like currents, for distances varying up to 10 cm.

Depending on this principle it is found by injection of emulsified fat in the various portal tributaries, and by the absorption of copper from the various isolated intestinal segments, that: (1) the blood from the stomach, spleen, duodenum, first part of the jejunum, and from the rectum, flows mainly to the left lobes of the dog's liver and least to the right lobes; (2) blood from the lower jejunum, ileum and first part of the large intestine, flows principally to the right lobes of the liver and least to the left lobes; (3) this independence is not entire, but overlapping, due to an intermixing of the portal currents; (4) the currents of blood from the splenic and rectal veins, are, at the hilus of the liver, more sharply defined than the currents of blood from the ileal veins which must flow a greater distance in the portal vein to reach the hilus of the liver, and consequently become more mixed and less independent.

21. **Effects of Hemorrhage and Reinjection of Blood and Saline Solution on Vasomotor Center.**—Pilcher and Sollmann found that hemorrhage progressively stimulates, depresses and paralyzes the vasomotor center. The period of stimulation is somewhat variable, but usually persists during a total hemorrhage of about 25 c.c. per kilogram when the blood-pressure has fallen to about 90 to 100 mm. A period of vasodilatation follows the stimulation; the perfusion flow may remain below the normal, return to the normal, or increase somewhat above the normal flow. The center becomes paralyzed when about 35 to 40 c.c. per kilogram has been withdrawn and when the blood-pressure has reached a low level (approximately 30 mm.). Reinjection of blood or saline solution before the onset of paralysis may restore the vasomotor tone. The low blood-pressure (shock) level depends chiefly on the amount of blood lost and not to an important degree on the rapidity of the hemorrhage. The relation of the fall of blood-pressure to the amount of blood lost varies in each animal; however, the median type is approached more or less closely by each experiment.

22. **Intravenous Infusion of Normal Saline.**—In normal animals Pilcher and Sollmann noted that the intravenous infusion of saline solution (10 to 40 c.c. per kg.) slightly stimulates the vasomotor center or leaves it unchanged. Occasionally, when the saline causes a maintained rise in blood-pressure, there may be considerable stimulation of the center. This variation is probably due to hypersensitive center. Above a 60 mm. level, the original blood-pressure seems to have no influence on the response of the vasomotor center.

23. **Venous Blood-Pressure in Man.**—According to Hooker the venous pressure exhibits a distinct diurnal rhythm, rising throughout the day from 10 cm. to 20 cm. and falling again during the night. Alterations in intrathoracic pressure produce an effect on the venous pressure which cannot be compensated. When the intrathoracic pressure approaches atmospheric pressure, the venous pressure rises, and vice versa. The data gathered by Hooker indicate that the normal venous pressure varies very considerably, averaging in the day time, under normal conditions, about 15 cm. of water. In sleep, at night it may fall to 7 to 8 cm. The pressure measured in the veins of the hand is not influenced by local changes in vascular tone or by changes in pulse-rate. The capacity of a vein may vary without affecting the internal pressure. In sleep the veins exhibit a pulse of peripheral origin. Normal venous pressure is independent of changes in peripheral arterial resistance. The suggestion that an hypothetical venomotor mechanism may function to maintain a constant feeding pressure to the heart is supported.

25. **Oxygen Pulse and Systolic Discharge.**—During bodily rest and with such slightly accelerated heart rates as are involved in merely walking about a room, Henderson and Prince found (in agreement with Murlin and Greer) that the quantity of oxygen consumed tends to be proportional to the pulse. The oxygen pulse under such conditions is, therefore, uniform at values ranging for different individuals between 2.5 and 6.5 c.c. With heart rates such as are induced by a distinct exertion and on up to hard muscular work, that is, rates from 80 to 100 per minute up to 130 or 140, the relation between oxygen pulse and heart rate prevails which is altogether different from that above stated. With some exceptions and variations the absolute augmentations are now proportional in such a relation that an increase by a definite amount in the oxygen pulse per minute, varying between 10 and 40 c.c. in different individuals, corresponds to an acceleration of one heart-beat per minute. The oxygen pulse at these heart rates, therefore, increases rapidly with acceleration of the rate. In most cases it reaches maximal values of 11 to 17 c.c. at rates of 130 to 140 per minute. With further cardio-acceleration it increases only slightly if at all; and it may even tend to decrease.

From these figures the authors infer that, if no considerable amount of oxygen is consumed in the lungs, the systolic discharge of the left ventricle of a well developed man working hard and with a pulse rate of 140 per minute is not less than 100 c.c. of blood. If the normal human heart obeys the principle of "superimposability of the volume curve" the systolic discharge at slow rates of beat is probably 150 c.c. or more. In men of poor physique it is probably not more than two-thirds as much. These figures are, however, considerably larger than those which most previous work has indicated.

27. **Ovarian Extirpation and Vasomotor Irritability.**—Hoskins and Wheelon found that ovarian extirpation in dogs results within six to eight weeks in a marked augmentation in the vasomotor reaction to a standard dose of nicotin. The reaction to epinephrin is not similarly increased. These results in comformity with clinical evidence indicate that the operations cause a heightened irritability in the sympathetic nervous system.

29. **Ultramicroscopic Clotting of Blood.**—Howell gives a description of the phenomena observed under the ultramicroscope when solutions of thrombin are added to oxalated blood-plasma or to solutions of fibrinogen. The essential point is that the fibrin formed is deposited not as a network but as separate well-formed needles of crystalline appearance which are massed to produce a mesh. Under certain conditions the process is incomplete, giving rise to the production of threads or rods of different lengths in place of the needles.

Bulletin Johns Hopkins Hospital, Baltimore

August, XXV, No. 282, pp. 223-254

30 *Significance of the Thymus in Exophthalmic Goiter. W. S. Halsted, Baltimore.
31 Summary of Studies of Loco-Weed Disease of Sheep. H. T. Marshall, Charlottesville, Va.
32 Behavior of Amebic Dysentery in Lower Animals and Its Bearing on the Interpretation of the Clinical Symptoms of the Disease in Man. W. A. Baetjer and A. W. Sellards, Baltimore.

30. **Thymus in Exophthalmic Goiter.**—It has been Halsted's practice of late in his strumectomy operations to investigate the contents of the space between the trachea and the manubrium with the object of determining the possible presence of an enlarged thymus. Only twice has he found it enlarged. The thymus symptoms predominated (attacks of dyspnea, diarrhea, no tachycardia, not much enlargement of the thyroid and not very definite eye symptoms). That the thymus plays an important part in Graves' disease, has been demonstrated beyond question by the results which have followed thymectomy. From the post-mortem examination of cases of exophthalmic goiter which have died of intercurrent disease it has been ascertained that the thymus gland is persistent in about 82 per cent. of them; and in those cases which have died of heart failure after operation enlargement has been found in about 95 per cent. At the Johns Hopkins Hospital there has been only one opportunity to make a necropsy on a patient with Graves' disease who died after operation. In this instance a long thick thymus gland was found tapering out from near the top of the manubrium sterni to the auricles of the heart.

From the facts gleaned at the autopsy table, from experiments on animals, and above all, from the results following primary thymectomies. Halsted has convincing evidence that the thymus gland may play an important part in exophthalmic goiter, and in some cases assume the title rôle. Some of the most puzzling features of the disease are made possible of interpretation by the discovery of the influence which the thymus may exert. Primary thymectomies uncomplicated by strumectomy and secondary thymectomies in cases not sufficiently relieved by resection of both lobes of the thyroid, Halsted says, would be the operations of choice for those searching for the essence of the Basedow symptoms. The combined operation would be avoided by them as much as possible until it became more definitely known how profoundly and in what particulars the thymus may influence disease.

California State Journal of Medicine, San Francisco

August, XII, No. 8, pp. 303-356

33 Study and Prevention of Tuberculosis. R. A. Peers, Colfax.
34 Id. G. E. Tucker, Riverside.
35 Earliest Manifestations of Tuberculosis and Treatment. G. E. Enright, San Francisco.
36 Why Are Better Results Not Being Obtained in the Prevention and Treatment of Tuberculosis? F. M. Pottenger, Monrovia.
37 Some Laboratory Aids in Diagnosis of Tuberculosis. G. H. Evans, San Francisco.
38 Prognosis of Pulmonary Tuberculosis. W. R. P. Clark, San Francisco.
39 Treatment of Pulmonary Hemorrhage. R. S. Cummins, Los Angeles.
40 Bureau of Tuberculosis, Its Work and Plans. B. F. Howard, Sacramento.
41 Arequipa Sanatorium; Sociologic and Economic Experiment in Care of Tuberculous Wage-Earning Girls. P. K. Brown, San Francisco.
42 Social Insurance in Its Relation to Tuberculosis. J. N. Force, Berkeley.
43 Induced Pneumothorax. E. von Adelung, Oakland.
44 Diagnosis, Significance and Treatment of Bronchial Lymph-Nodes in Infancy and Childhood. W. P. Lucas, San Francisco.
45 Indication for Labyrinth Operation, with Report of Eight Cases Not Operated. C. F. Welty, San Francisco.
46 Uterine Replacement with Particular Attention to Buteau Suspension. C. A. Dukes, Oakland.
47 Buttermilk and Green's Treatment of Three Cases of Grave Secondary Anemia. J. Jackson, Pasadena.
48 Dangers of Vaginal Examinations during Labor. A. Miller, Porterville.
49 Intraspinous Treatment of Tabes. Preliminary Report. S. J. Gardner, W. B. Coffey and W. T. Cummins, San Francisco.

Canadian Medical Association Journal, Toronto

August, IV, No. 8, pp. 661-756

50 Relation of Theory and Practice in Operative Treatment of Genital Prolapse. H. Jellett, Dublin, Ireland.
51 Surgical Teaching. R. Morison, Newcastle-upon-Tyne.
52 Infant Mortality. A. Brown and G. Campbell, Toronto.
53 *Cardiac Hypertrophy. T. F. Cotton, Montreal.

53. **Cardiac Hypertrophy.**—One hundred and fifty hypertrophied hearts were examined by Cotton. Of the kidney cases the greater number were of the interstitial type with hypertension and cardiac enlargement. In all the increase in weight of the whole heart was constant; the values of the relative weights of the ventricles, however, varied within wide limits. In some there was a marked hypertrophy of the left ventricle, in a few right hypertrophy predominated, while in many the normal relationship of the two ventricles was maintained. Microscopic sections showed myocardial degeneration in many; this was difficult to establish in a few. Cotton suggests that the altered state of the heart muscle may play an important rôle in the development of hypertrophy in the different chambers of the heart, while in many cases of hypertrophy associated with aortic valve lesions the hypertrophy was borne by the left ventricle. Cotton not uncommonly found a general hypertrophy, and in some a right hypertrophy, and this distribution seemed to bear no relation to the severity of the valvular lesion. He believes that here, undoubtedly, the back flow of blood during diastole into the left ventricle must increase the work of that chamber, and will explain in part the resulting hypertrophy.

Cotton would not look on the valvular defect as the essential factor in the production of the hypertrophy. If so, he says one should expect to find in those hearts with a general or right-sided hypertrophy, a greater incompetency of the aortic valves. In his case he did not observe any difference in the valvular lesions corresponding with the hypertrophy present. He did, however, note that a greater or less degree of muscular degeneration was generally present. Therefore, he would, as in renal cases, look on the degenerated myocardium as playing an important rôle in the development of the hypertrophy. In those hearts with mitral insufficiency, hypertrophy of the left ventricle was not a constant finding. In the majority of hearts hypertrophy was more developed in the left chamber, but in many the hypertrophy was general, the relative weights of the two ventricles being within normal limits, while in a few hypertrophy of the right ventricle predominated.

Only in one group of cases did Cotton's results corroborate the back pressure theory as an explanation of the hypertrophy associated with valvular lesions. In those hearts with mitral stenosis uncomplicated by any other valvular lesion, he found in every instance hypertrophy of the right ventricle predominating. Of those hearts with degeneration of the myocardium but with the valves quite intact, where the leaking or narrowed valve could not be a factor in embarrassing the heart's action, the results in the main corresponded with renal hearts. The hypertrophy was oftener of the left ventricle, not uncommonly the whole heart was increased in size, and occasionally the ratio of the ventricular weights was below 1.77, which he found to be normal.

Delaware State Medical Journal, Wilmington

June, V, No. 7, pp. 1-26

54 Appendicitis Mistaken for Right Pyosalpinx. H. J. Stubbs, Wilmington.

Illinois Medical Journal, Chicago

August, XXVI, No. 2, pp. 77-152

53 Relation of Precordial Pain to Heart Disease. J. M. Patton, Chicago.
56 *Some Psychic Factors of Surgical Anesthesia. R. H. Ferguson, East Orange, N. J.
57 Case of Tumor of Hypophysis with Operation. E. Hill, Chicago.
58 Problem of the Stammering Child. E. L. Kenyon, Chicago.
59 Radium; Some of Its Uses in Skin Diseases. F. E. Simpson, Chicago.
60 Experience with Milk Sickness. A. J. Clay, Hoopeston, Ill.
61 Imperforate Anus; Report of Two Cases. M. H. Smith, Sherrard, Ill.
62 Further Advancement in Studies of Syphilis. B. C. Corbus, Chicago.
63 Bone Transplantation for Cure of Tuberculous Spine Disease, with Report of Cases. C. M. Jacobs, Chicago.
64 *Specific Treatment of Hay-Fever by Active Immunization. K. K. Koessler, Chicago.
65 A Booster Sermon. C. W. Carter, Clinton, Ill.

56. **Psychic Factors of Surgical Anesthesia.**—Ferguson considers in detail the psychic phenomena of patients awaiting anesthesia and which the successful anesthetist must have clearly before him. Except under certain special circumstances, he does not believe in controlling the mind of the patient by drugs. He says it is always best to guide or subdue psychic phenomena by psychical technic. The endeavor of the anesthetist should be to have his patient believe that he knows his business and that he has perfect confidence in his patient taking the ether well. The method should be by action not words. Keep from the senses of the patient to be anesthetized anything and everything that could disturb him or impress on him undesirable ideas. Everything, even to the most trivial circumstances should make for tranquility of mind, and the leaving of pleasing impressions on the sensorium of the patient. If perfect trust in the anesthetist is wanting the patient will try to control the induction, thereby disturbing it, particularly when coordination of the senses is wanting. This negative condition, a lack of confidence, becomes positive distrust if anything that may be interpreted as deception occurs and early in the induction the patient antagonizes the anesthetist. Ferguson discusses all phases of this subject in detail.

As to the preliminary use of morphin, Ferguson objects to it because patients differ so in their idiosyncrasy to morphin that a correct dose is difficult to determine. It does away with the anesthetist's two most important waymarks, the character of the respiration and the light reflexes of the pupils. Unless administered in undue quantity, morphin prolongs the induction and necessitates more ether to be used, since it diminishes both the number of respirations per minute and the amount of tidal air at each respiration. Morphin prevents the patient clearing the larynx if necessary. Morphin favors sudden respiratory arrest with a slow, intermittent respiration after it has been restored. Morphin favors postoperative nausea and vomiting. Morphin may allow asphyxia during recovery. The three classes of case in which Ferguson demands its use are these: 1. Nervous cases with marked physical manifestations. 2. Pronounced alcoholics. 3. Young or middle-aged men of a marked athletic type or build.

64. **Specific Treatment of Hay-Fever by Active Immunization.**—In the last four years Koessler had treated 41 hay-fever patients by active immunization with pollen extracts, made by his method. Five of these had the early spring variety of the disease, and all these began treatment after the disease was already developed. The remaining 36 had autumnal catarrh. Seventeen of these patients had prophylactic treatment, whereas, 19 were treated while symptoms of hay-fever were present. Four of these patients had been completely free from hay-fever, though remaining in their usual place of abode. Of these 4 patients, 3 had treatment during two years, and one during three years—for two to three months. The supreme test in patients who are apparently free from the disease, is a railway or an automobile journey through flowering fields. Only these 4 patients of the 41 could stand this experiment; 2 of them have so far remained free for two years, and 2 for one year. Of the other 37 patients, 29 were markedly improved subjectively as well as objectively. The remaining 8 are considered objectively not improved, though 5 of them feel subjectively benefited. The marked improvement consists in later, milder and shorter attacks, in the possibility of remaining in town and at work for the first time in years, in a diminution or disappearance of troublesome cough and constitutional symptoms. Twenty-three of the 41 patients had previous asthmatic attacks during the day and night in the critical season. Of these 16 experienced an undoubted amelioration of this most distressing feature of the disease. Six of these hay-fever asthmatics had no asthmatic symptoms, though 5 of them still retained other symptoms of hay-fever. Others had only 2 or 3 attacks during the whole season, were little disturbed in their sleep during the night, while emphasizing the improvement experienced.

Indiana State Medical Association Journal, Fort Wayne

August, VII, No. 8, pp. 357-396

66 Local Manifestations in Ear, Nose and Throat, Associated with Disease of Nervous System. J. D. Heitger, Bedford.
67 Stricture of Male Urethra. F. G. McCarthy, Terre Haute.
68 Tinted (Light Gray) Operating-Rooms. J. R. Eastman, Indianapolis.
69 Early Diagnosis of Ruptured Ectopic Pregnancy. C. Sudranski, Greencastle.

Journal of Experimental Medicine, Lancaster, Pa.

August, XX, No. 2, pp. 93-200

70 *Studies in Experimental Atherosclerosis. I. Adler, New York.
71 *Relation of Spleen to Blood Destruction and Regeneration and to Hemolytic Jaundice. Supposed Regulatory Influence of Spleen in Formation and Destruction of Erythrocytes. E. B. Krumbhaar and J. H. Musser, Jr., Philadelphia.
72 *Id. Influence of Spleen on Iron Metabolism. J. H. Austin and R. M. Pearce, Philadelphia.
73 Effect of Variation in Osmotic Tension and of Dilution of Culture Media on Cell Proliferation of Connective Tissue. A. H. Ebeling, New York.
74 *Cultivation of Human Sarcomatous Tissue in Vitro. J. R. Loose and A. H. Ebeling, New York.
75 *Removal of Calcium from Blood by Dialysis in Study of Tetany. W. G. MacCallum, R. A. Lambert and K. M. Vogel, New York.
76 Experimental Production of Necrosis of Liver in Guinea-Pig. M. S. Fleischer and L. Loeb, St. Louis.
77 *Effect of Intravenous Injection of Substances Affecting Tumor Growth on Cyclic Changes in Ovaries and Placentomata. M. S. Fleischer and L. Loeb, St. Louis.
78 *Circulation of Kidneys Following Ligation of One Ureter. A. A. Ghoreyeb, Boston.

70. **Experimental Atherosclerosis.**—Although he does not arrive at any definite conclusions as the result of his experiments, Adler states, that in all probability the theory which bases atherosclerosis on a purely mechanical etiology will not prove tenable. Whether mechanical factors come into play at all, and if so, to what extent, remains to be seen. It seems almost certain, at least in our present state of knowledge, that chemical influences, subject possibly to more or less nerve control are dominant factors in the etiology of atherosclerosis. Perhaps it may be discovered also that cholesterin and its various modifications and combinations, while undoubtedly an element of importance in atherosclerosis of the rabbit and human beings, may not be the sole predominant etiologic factor. If it should turn out that so simple a procedure as adding a certain proportion of hydrochloric acid to the food of dogs is sufficient to produce lesions of the blood-vessels closely analogous, if not wholly identical with human atherosclerosis, a revision of our present theories will become necessary.

71. **Spleen, Blood-Destruction and Regeneration, Hemolytic Jaundice.**—Krumbhaar and Musser conclude that the slight differences between the arterial and venous blood of the spleen are within the limits of error inherent in the methods of blood examination and are not be explained by a peculiar action of the spleen. In some instances peculiarities shown by the splenic venous blood are common to the venous blood of the general circulation. Banti and Furno's observation concerning the presence of free hemoglobin in the blood of the splenic vein is not confirmed.

They also found that fresh extracts of spleen are devoid of definite hemolytic action. Occasional trivial and irregular results, not to be explained, are found, but these occur likewise in the control extracts of liver and mesenteric lymph-nodes. Twenty-four-hour extracts prepared at low temperature, show little or no increase in hemolytic activity. Boiled splenic tissue, extracted in the cold for twenty-four hours, is inert.

Intraperitoneal injection of saline extracts of fresh spleen constantly causes a sharp increase in red cell count and hemoglobin content. The rise is evanescent, lasting but one or two days, and may be followed by an equally evanescent drop below normal. Similarly prepared extracts from other organs fail to give this rise. No noteworthy change is found in the resistance of the red blood-cells to hypotonic salt solution, or in the number of skeined or reticulated erythrocytes, after the injections of the various organ extracts. A temporary increase of polymorphonuclear and transitional leukocytes usually follows the use of spleen extract, but may occur also, though less frequently, after the injection of liver and kidney. The constant increase of red cells in the peripheral circulation after injection of spleen, in view of the tendency to anemia following splenectomy, suggests that the spleen normally may exert a stimulating effect on the formation of red cells in the bone-marrow. The feeding of fresh raw spleen to splenectomized dogs has no clearly defined influence in preventing the anemia which usually occurs after splenectomy.

72. **Influence of Spleen on Iron Metabolism.**—Austin and Pearce's studies give evidence of increase in the iron elimination in three of five dogs during a period of two weeks following splenectomy, but not in two other dogs. The occasional increased output of iron may have some relation to the anemia which occurs in the early weeks after splenectomy and which varies in degree in different animals. No evidence was secured of an increase in the iron output at one, nine and twenty months after splenectomy. From their own studies and from examination of the literature of the subject the authors conclude that the spleen does not exercise a constant and important influence on the iron metabolism of the body.

74. **Cultivation of Human Sarcomatous Tissue in Vitro.**—Two experiments were made by Losee and Ebeling in which fragments from human sarcomatous tissue were cultivated. It was possible to keep cultures of such tissue in a condition of active life *in vitro* for several generations. One culture was stained which was growing actively in its twelfth passage (twenty-one days). One other culture was carried through for twenty-four passages, that is, fifty-two days. It was possible to divide this culture in its fifteenth passage, making two, and after forty-eight hours incubation one of these cultures was fixed. Sarcomatous tissue grew as well during a few days as normal connective tissue. Afterward the rate of growth became less rapid and the tissue could not be kept alive for more than fifty-two days, while normal human tissue could be kept for sixty-eight days.

75. **Removal of Calcium from Blood.**—It was found by the authors that one may devise a fluid containing practically all the inorganic diffusible constituents of the blood except calcium, and use it to dialyze normal blood in such a way as to remove from it a large part of its calcium. The dialyzed blood when perfused through an isolated extremity produces an extreme hyperexcitability of the nerves quite like that observed in tetany. Since perfusion with blood dialyzed in precisely the same way against a fluid of the same composition, but containing calcium in the proportion found in the normal blood, causes no hyperexcitability of the nerves it is evident that the hyperexcitability is due to the lack of calcium. This effect can be attained in only a slight degree by replacing the blood of a whole animal with the dialyzed blood, since under the conditions of the experiment the tissues cannot be sufficiently depleted of their calcium. It seems probable that the parathyroid secretion is not removed by dialysis, but is returned to the body with the dialyzed blood.

To bring this result into relation with the condition in tetany following parathyroidectomy, animals in tetany were bled and the blood was replaced in one case with normal blood, in the other with dialyzed blood poor in calcium. The normal blood immediately relieves the tetany and lowers the excitability, while the dialyzed blood does not. The authors believe, therefore, that this is a further proof that in the tetany of parathyroidectomy also the twitching and hyperexcitability of the nerves is due to lack of calcium in the blood and tissues.

77. **Intravenous Injection, Tumor Growth and Cyclic Changes in Ovaries.**—If six to seven days after copulation incisions are made under ether anesthesia into the uterus, and on the day following this operation one or several injections of hirudin are given, Fleisher and Loeb noted that changes set in the ovaries which correspond to those found at the time of ovulation; namely, a degeneration of all the follicles with the exception of the small ones. These degenerative changes are followed by the same developmental changes as in the normal cycle. This represents a second method of altering experimentally the periodicity of the sexual cycle, the first consisting in the early extirpation of the corpora lutea.

Under the same conditions intravenous injections of hirudin destroy, in the large majority of cases, the greater part of experimental placentomata through hemorrhages, and they prevent the remaining placentomatous areas from active proliferation, probably as a result of interference with the circulation. These injections may also cause abortion in pregnant animals. Intravenous injections of hirudin produce a tendency to hemorrhage at various places in the body, and these hemorrhages are prone to occur, especially in rapidly growing tissues, in which the blood-vessels are less resistant, as in tumors and in placentomata, also in the neighborhood of necrotic areas. In the stomach the hemorrhages may be followed by digestion of the tissues through the gastric juice. It is probable that there is a connection between the action of hirudin on the blood (coagulability and viscosity) and the tendency to hemorrhage. Withdrawal of blood, intravenous injections of distilled water, colloidal copper, nucleoproteid, or casein have no marked effect on the cyclic changes in the ovaries or on placentomata.

78. **Circulation of Kidneys Following Ligation of Ureter.**—During the first week following ligation of one ureter there is found an impediment to circulation which is removed on opening the distended pelvis and reducing the intrapelvic pressure. This impediment, therefore, is probably due to the compression of the blood-vessels within the kidney brought by dilated tubules and unyielding capsule, and also possibly to disturbance of circulation produced by the distention of the pelvis. The venous and arterial branches passing over this may be either compressed or in various ways distorted.

During this period the anemia produced by the impediment together with pressure and other factors gives rise to changes in kidney tissues which reveal themselves microscopically as a swelling and degeneration of the epithelial cells. At the end of one week following ligation of one ureter there is an impediment to the circulation other than due to intrapelvic pressure. This impediment is probably due to cicatricial changes in the organ, which tend to maintain the tubules dilated and in a position of encroachment on the space normally allotted to blood-vessels, and which manifest themselves microscopically as a connective tissue cell infiltration into the interstitial tissues of the kidney, and an increase in vascular cells of the tufts diminishing the caliber of the tuft capillaries. The increased amount of work thrown on the control kidney produces no lesions other than a hypertrophy, which permits a greater and more rapid circulation through its vascular system.

Kentucky Medical Journal, Bowling Green

August 1, XII, No. 14, pp. 453-474

79 Acute Dysentery. F. M. Sherman, Lewisport.
80 Our Armor-Plate. E. D. Burnett, Anchorage.
81 Medical Progress in the Past Thirty Years. R. Lockhart, Owensboro.
82 Medical Doxology. J. A. Freeman, Crestwood.

83 Cancer of the Breast, with Particular Reference to Certain Phases of Diagnosis. N. Evans, Murray.
84 Uncinariasis. J. A. Frantz, Russell.
85 Gonorrheal Arthritis and Tenosynovitis; Report of Two Cases. S. E. Vidt, Russell.

Missouri State Medical Association Journal, St. Louis

July, XI, No. 1, pp. 1-60

86 Prevention Rather than Cure. E. H. Miller, Liberty.
87 Professional Reminiscences and Plea for Medical Unity. T. F. Lockwood, Butler.
88 Practical Points for General Practitioner Compelled to do Eye-Work. J. W. Charles, St. Louis.
89 Medical Libraries. R. E. Schlueter, St. Louis.
90 History of Missouri Medical College, from 1840 to 1861. A. B. Barbee, St. Louis.
91 House-Fly. S. Lambeth, Verona.

August, No. 2, pp. 61-112

92 Dispensary Treatment of Diabetes Mellitus. R. H. McBaine, St. Louis.
93 Medical Legislation. C. P. Emerson, Indianapolis.
94 Congenito-Mechanical Dilatation of Colon. F. W. Bailey, St. Louis.
95 Early Recognition of Clinical Significance of Gastric Disturbance. A. J. McNees, Clinton.
96 Cervical Ribs. C. Potter, St. Joseph.
97 Case of Renal Calculus. G. D. McCall, Fulton.
98 Some Chemical and Germicidal Properties of Antiseptics and Disinfectants. R. Cross, Kansas City.
99 Splenopexy and Right-Sided Nephropexy Simultaneously. W. F. Grinstead, Cairo, Ill.
100 Pellagra in City Hospital. A. H. Fortner, St. Louis.
101 Advisability of Prematrimonial Medical Examination from Standpoint of Woman. M. H. McLean, St. Louis.

New Jersey State Medical Society Journal, Orange

August, XI, No. 8, pp. 379-430

102 Conservation of Child Life. M. J. Synnott, Montclair.
103 Infancy of Migraine and Arteriosclerosis. D. E. English, Summit.
104 Treatment of Pertussis. C. H. Finke, Jersey City.

New York Medical Journal, New York

August 15, C. No. 7, pp. 301-348

105 National Quarantine. L. E. Cofer, Washington, D. C.
106 Value of Skimmed Milk and Its Dilution in Fever. L. Fischer, New York.
107 Effects of Caffein and Nicotin on the Activity of the Intestinal Musculature. W. A. Frankland, Washington, D. C.
108 Campaign against Pulmonary Tuberculosis. A. Robin, Wilmington, Del.
109 Value of Renal Functional Tests to the Surgeon and the Limitations of These Tests. J. T. Geraghty, Baltimore.
110 Pyloric and Duodenal Obstruction. F. Buckmaster, Effingham, Ill.
111 Further Development of the Usefulness of the Sanatorium. C. B. Slade, New York.
112 Treatment of Diabetes Mellitus with Bacillus Bulgaricus. P. Horowitz, New York.
113 Sputum Trap for Lung Examinations. G. E. Barnes, Herkimer, N. Y.

Surgery, Gynecology and Obstetrics, Chicago

August, XIX, No. 2, pp. 131-300

114 Fractures Near Joints. H. M. Sherman. Fractures into Joints. H. M. Sherman and D. Tait, San Francisco.
115 Tumors of Neck. F. E. McKenty, Montreal.
116 Case of Common Ileocolic Mesentery with Torsion. C. Tage-Hansen, Copenhagen, Denmark.
117 Tuberculosis of Kidney: with Special Reference to Its Diagnosis. G. E. MacKlem, Detroit.
118 *Operative Treatment of Aneurysm of Aorta. H. Kümmell, Hamburg-Eppendorf, Germany.
119 Essential Dysmenorrhea. T. J. Doederlein, Chicago.
120 Calcified Fibroma Uteri Compressing Sigmoid Colon. G. de Tarnowsky, Chicago.
121 Traumatic Periosteal Bone and Callus Formation. O. J. Fay, Des Moines, Iowa.
122 Infraction of Second Metatarsal Bone. Report of Six Cases. A. H. Freiberg, Cincinnati.
123 Congenital Contractures of Fingers. Report of Case of Familial Type. H. Neuhof and E. D. Oppenheimer, New York.
124 Modern War Surgery. R. J. Behan, Pittsburgh.
125 *Contractured Psoas Parvus Tendons. Report of Two Cases. T. L. MacDonald, Wassington, D. C.
126 Sarcoma of Round Ligament of Uterus. F. J. Taussig, St. Louis.
127 *Repair of Accidental Injuries to Rectum. C. G. Heyd, New York.
128 Technic of Intrathoracic Operations. A. Carrel, New York.
129 Avulsion of Scalp. A. A. Law, Minneapolis.
130 Anterior Choledojejunostomy. Report of Case. R. H. Jackson, Madison, Wis.
131 *New Method of Circumcision. W. L. Thornton, Birmingham, Ala.
132 Further Development of an Apparatus for Transfusion of Blood. H. S. Satterlee and R. S. Hooker, New York.
133 *Use of Pituitary Extract in Labor. D. G. Madill and R. M. Allan, Dublin.
134 *Axillary Sup. G. S. Foster, Manchester, N. H.

118. **Operative Treatment of Aneurism of Aorta.**—The plan of operation adopted by Kümmell in one case cited was to lay bare the aorta as much as possible retropleurally and retroperitoneally, and after compressing it to remove the sac and close the opening in the artery by suture. Therefore several ribs (the fourth to sixth) were resected at the spinal column, care being taken to spare the pleura, and a large enough opening produced in the wall of the thorax so that the hand could easily be inserted. The pleura, which was somewhat thickened, was not injured, so that it was not necessary to use the positive-pressure apparatus that was held in readiness. The pleura was pushed forward and the thoracic aorta laid bare without difficulty as far as the sac of the aneurism, which was found to lie above the diaphragm.

A rubber tube was laid under the thoracic aorta in order, if necessary, to utilize it for a temporary closing of the artery. Kümmell did not have to use it, but produced the necessary compression with the fingers. The thoracic aorta was compressed between the thumb and index finger of an assistant at the diaphragm and the upper boundary of the pulsating tumor that was now covered only with a thin skin; the sac of the aneurism was laid bare with a long incision, the tear which was already present enlarged, and masses of clot removed. In order to be able to see the lower part of the normal aorta at the edge of the sac, Kümmell split the diaphragm and laid bare the upper part of the abdominal aorta retroperitoneally, so that there was a free view of the field of operation, including the thoracic and abdominal aorta and the sac of the aneurism. The sac of the aneurism was larger than the fist and the original tear in it was 10 cm. long. Kümmell passed his index finger into the normal lumen of the aorta above and below the aneurism from the inside of the sac and trimmed the latter so that a vessel corresponding to the normal lumen of the aorta was formed. The aneurism had caused a bulging chiefly of the posterior wall of the aorta, and had left the part of the artery lying immediately behind the spinal column comparatively unaffected. The 10-cm.-long slit in the new-formed aorta, that was now freely exposed, was closed with a continuous suture and the digital pressure somewhat relaxed. As a little blood still emerged from some places, a second continuous suture was applied over the other without any special difficulty. During the compression the blood-pressure had risen to double its normal height from the exclusion of the greater part of the circulation.

The digital compression of the aorta had lasted about twelve minutes. As it was gradually relaxed and finally withdrawn altogether, the suture was found to be sufficient. Not a drop of blood exuded from the line of suture. The pulsation in both femorals was strong and the pulse in the dorsalis pedis could be distinctly felt. The operation had taken about an hour, and after its completion the patient was in comparatively good condition, which is attributed to the fact that he was anesthetized by the intravenous administration of ether, and the heart was kept strong by the continuous influx of salt solution and ether. But he gradually grew weaker and weaker, and finally died of heart failure.

125. **Contractured Psoas Parvus Tendons.**—In the cases of moderate contracture, McDonald says, complete thigh extension may be possible but painful. Restriction is definite. In the suppurative cases of appendicitis the contractured tendon may readily be overlooked because of the importance of terminating the operation at the earliest moment, of indulging in the least possible intra-abdominal manipulation, and because bowel and omental adhesions supervene. The cardboard-like edge of the shortened tendon is capable of damming—to a most troublesome degree—the cecal current, the relief of constipation after tenotomy being quite noteworthy, even while the patient is lying in bed. At present the stripping up of the peritoneum from the outer edge of the abdominal wound, as though to expose the ureter, seems satisfactory and feasible for exposing the tendon for tenotomy, when the abdomen is opened through the oblique incision. Prompt relief to the symptoms may be expected

after complete tenotomy. In the postoperative cases the leaning attitude of the patient may well suggest adhesions. The persistence of thigh flexion under anesthesia is characteristic. McDonald's patients were inclined to be neurotic.

127. **Repair of Accidental Injuries of Rectum.**—A colon tube is introduced into the anus and passed up the rectum to a point 1 inch above the injury. Through the anterior rectal wall and the portion of tube above the injury a transfixion suture of number two chromic gut is passed which firmly anchors the tube to the upper portion of the anterior wall. The peritoneum on each side of the defect and parallel with the rectum is incised for a distance of about two and a half inches. By this maneuver the upper rectum becomes mobilized, after the manner of Kocher for mobilizing the duodenum. By gentle traction on the tube protruding through the anus the two lips of the rectal defect are brought together and approximated by three or four interrupted mattress sutures.

Two Allis clamps, one on each side, are placed about one-half to three-fourths inch below the suture line for the purpose of fixing the lower segment. Traction is made on the tube and as a result the upper segment of the anterior rectal wall is "telescoped" into the lower rectal segment. There is thus produced an artificial intussusception of the anterior rectal wall. The original defect or injury is carried down into the lower bowel and by the rolling in of the anterior rectal wall a peritoneal approximation is assured. A right-angle Cushing suture of Pagenstecher thread is passed along the site of peritoneal contact, completing the repair of the rectum. The lateral peritoneal defects are closed and the tube sutured to the anal margin with silkworm gut, thereby making gentle but firm traction on the upper rectal segment.

131. **New Method of Circumcision.**—In Thornton's method the prepuce is slit dorsally between two artery clamps. By passing a fine needle, threaded with silk, through the skin and around the superficial vessels they may be lightly ligated near the line of incision. The ventral margin of the prepuce is grasped by a clamp. At intervals of about three-sixteenths of an inch, number nine milliners' needles threaded with fine black silk are placed through mucosa and skin in a line around the penis about one-fourth inch from the corona of glans penis. The redundant prepuce is removed by cutting with scissors around the line marked by the needles. Each suture is then drawn through and tied. Since all incised tissues are included in the sutures, hemorrhage should be controlled when sutures are tied. However, if there should be a bleeding point, an additional suture is placed.

This method of circumcision is said to have the following advantages: The line of incision in skin and mucosa is accurately marked off and held in place by the needles, preventing unevenness and loss of bearings. Complete hemostasis. Prevention of retraction of subcutaneous tissues. Prevention of dead space and subsequent hematoma. Prevention of exposure of subcutaneous tissue to infection. Less traumatism. Less pain and priapism following operation.

133. **Use of Pituitary Extract in Labor.**—Madill and Allan report the results of 147 cases, studied at the Rotunda Hospital. They found pituitary extract undoubtedly increases the strength of the uterine contractions. These strengthened contractions maintained their physiologic character. The best results were obtained when given during the second stage. Its use reduced the number of forceps operations, with consequent lessening of morbidity in these cases. It is safe for the mother, and at least as safe as forceps for the child. It gives improved results for both mother and fetus in cases of placenta praevia, if used in combination with version. The puerperium is normal.

134. **Axillary Sup.**—Under this title Foster describes Lane's method of giving free fluid to the support of the circulatory system. He reports his observations on fifty cases of general surgery. The fluid used is normal saline solution which is placed in a reservoir to which is connected a "Y" rubber tube with glass connections. The single tube of this "Y" is sufficiently long to permit it to be coiled within a porcelain enamel basin filled with hot water kept at 110 degrees. The saline solution is also poured into the reservoir at this same temperature. Such an arrangement allows of a drop of from five degrees to ten degrees before reaching the hypodermoclysis needles. The reservoir is placed at a proper elevation so that sufficient column pressure is exerted to easily force the saline into the subcutaneous tissues. The hypodermoclysis needles are always kept very sharp that they may pierce the skin with ease. They are three inches long, with the lumen large enough to permit a free stream of the fluid.

After the patient is fully under the anesthetic the chest is laid bare. A section of the skin area just inside of the external border of the pectoralis major muscle over its most prominent part and above the mammary gland is cleansed with antiseptic soap. The suds is then wiped away and the skin perfectly dried with sterile gauze. This skin area is then painted with full-strength tincture of iodin. While the fluid is running the needles are introduced piercing the pectoralis muscle in a direction outward and slightly tilted downward until the needle point is seen to push the loose skin of the axilla before it. The point is then moved about slightly to make sure it is properly situated and free. The amount of fluid supped during any operation depends on the time consumed in operating. No case has supped less than 40 ounces and some cases have taken as high as 140 ounces during an operation. The average operation on an average sized individual will require between 75 and 90 ounces. At the completion of the operation the needles are withdrawn and the skin apertures sealed with collodion and sterile cotton.

Tennessee State Medical Association Journal, Nashville

August, VII, No. 4, pp. 143-186

135 Suggestions for Change in State Law Concerning Expert Testimony. S. T. Rucker, Memphis.
136 Bone Transplantation. Report of Cases. E. T. Newell, Chattanooga.
137 Pistol Wounds of Brain. Report of Two Cases. J. L. Crook, Jackson.
138 Necessity of Wassermann Reaction in Controlling Treatment of Syphilis. H. Spitz, Nashville.
139 Pneumonia. A. D. Walker, Friendship.
140 Pain in Abdomen. E. W. Mabry, Gainesboro.
141 School Hygiene. T. J. Coble, Shelbyville.

FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

British Journal of Children's Diseases, London

August, XI, No. 128, pp. 337-384

1 *Auricular Flutter in Acute Rheumatic Carditis. G. A. Sutherland.
2 Familial Case of Splenomegalic Anemia with Infantilism. F. P. Weber.
3 *Associated Movement of Jaw and Upper Lid: Jaw-Winking Phenomenon. D. A. Cockayne.

1. **Auricular Flutter in Acute Rheumatic Carditis.**—Auricular flutter is often latent and unsuspected. As practical points for further investigation Sutherland suggests that attention be paid to the following possible indications of the presence of this abnormal form of rhythm: (1) Attacks of cardiac asthma (great dyspnea) occurring suddenly and without accompanying variations in the cardiac condition. In one case cited by Sutherland, there were two such attacks preceding the acute illness, and they were at the time diagnosed as asthmatic in origin. (2) A triple or galloping or cantering rhythm heard on auscultation. In two cases cited there was a triple rhythm present, heard both at the apex and in the neck. In Dr. Morison's case of jugulo-embryocardia, which was the first example of auricular flutter recorded, each auricular contraction was audible in the right supraclavicular region, the auricular rate being 240, while the ventricular was 114. (3) Pericarditis without effusion and with great respiratory distress. The inflammatory changes in pericarditis are usually earlier and more marked about the

auricles than the ventricles, and a disturbed auricular rhythm may follow from the active effusion in and around the auricular walls. (4) Dyspnea, cyanosis and enlargement of the liver out of proportion to the physical signs of disease of the heart. (5) The presence of the pulsus alternans. Further investigations will be required to determine whether in cases of acute carditis a disordered rhythm of this nature is often present.

3. **Associated Movement of the Jaw and Upper Lid.**—Cockayne's case occurred in a baby girl first seen at 6 months of age. The movements were first noticed when she was about a month old. The right eyelid went up and down as the baby sucked at the breast. The baby was fat and healthy looking, but there was a slight ptosis of the right upper lid, such that the lid fell as low as the level of the upper edge of the pupil. As far as one can tell in so young a baby, voluntary movement of the levator was good, and also of the other ocular muscles. The pupils were equal and reacted to light; there was no facial asymmetry, and no difference in size of the tarsal plates. As the baby sucked the right lid was raised synchronously with the movements of the jaw so that a little sclerotic was shown each time above the right cornea. As the jaw was moved away from the side of the lesion, as in grinding the teeth, the lid was raised. An almost imperceptible lateral movement was sufficient. The left lid was not moved, and the right eye itself remained stationary. Slight sucking movements produced no movement of the lid. When the baby yawned or laughed the lid was retracted to an extreme degree and showed a large extent of sclerotic. The movements are diminishing in frequency and in extent. There is no history of a similar condition or of ptosis in the family.

British Medical Journal, London

August 8, II, No. 2797, pp. 277-320

4 Vis Medicatrix Naturae. J. A. Thomson.
5 The Responsibility of the State in Connection with Venereal Disease. A. K. Chalmers.
6 Public Measures Against Venereal Disease in Denmark. E. Pontoppidan and L. McIlroy.
7 Essential Preventives of Prostitution. L. Grant.
8 State Medical Service vs. A Panel System. J. Collie, H. H. Mills, R. C. Buist and M. Dewar.

Dublin Journal of Medical Sciences

August, No. 512, pp. 81-156

9 Clinical Value of Staining Urinary Deposits. E. S. Johnson.
10 Clinical Report of Rotunda Hospital for One Year, Nov. 1, 1912, to Oct. 31, 1913. H. Jellett, D. G. Madill and R. M. Allan.
11 Two Cases of Pseudo-Hypertrophic Muscular Dystrophy. A. F. B. Shaw.

Edinburgh Medical Journal

August, XIII, No. 2, pp. 97-192

12 New Route of Inquiry as to Nature and Establishment of Typical Sex-Ensemble in Mammalia. H. D. B. Hart.
13 Anaphylaxis and Status Lymphaticus; Their Relation to Intensified Types of Disease in Infancy and Childhood. H. C. M'Neil.
14 Habit as Pathological Factor. A. J. Brock.
15 Intratracheal Insufflation of Ether. H. T. Thompson.
16 Roentgen Ray and Bismuth Meal Method as an Aid in Diagnosis of Some Alimentary Diseases. E. Price.

The Glasgow Medical Journal

August, LXXXII, pp. 81-160

17 Gangrenous Appendicitis with Coprolith, Abscess, Septic Peritonitis, Intestinal Obstruction, Rupture of Intestine, and Fistula: Complete Recovery. S. Mort.
18 The Western Medical School, Glasgow. J. N. Morton.

Lancet, London

August 8, II, No. 4745, pp. 359-434

19 Cancer of the Uterus. Charles Ryall.
20 Nature of Peritoneal Adhesions. Arthur Keith.
21 *Osteo-Arthritis of the Hip; Diagnosis in Its Early or Preosteophytic Stages. R. L. J. Llewellyn.
22 After-Care of the Consumptive. H. W. McConnell.
23 Treatment of Yaws by Intravenous and Intramuscular Injections of Neosalvarsan and Salvarsan. P. Harper.
24 Pneumosan in the Treatment of Pulmonary Tuberculosis. A. E. Carver.

21. **Osteo-Arthritis of the Hip.**—Llewellyn and Jones comment on the extreme slowness with which the condition of osteo-arthritis of the hip is established and emphasize the extreme length of time that may elapse before bony outgrowths can be detected. From their consideration, therefore, of the clinical features, supplemented by the results of roentgenography, they are led to postulate two stages in the life history of osteo-arthritis: 1. A primary or preosteophytic phase, often of prolonged duration, whose clinical characteristics are those of villous hypertrophy. 2. A secondary or terminal stage in which bony and cartilaginous outgrowths make their appearance.

Their presumption as to the villous nature of the disorder is based on the occurrence of attacks of pain with pseudo-locking sensations which come and go in the same erratic fashion that we are familiar with in the case of the knee. In addition, too, there is in some instances accessory evidence in the shape of villous overgrowths in the knees, which, of course, in this articulation are more easy of detection by palpation. In support of their contention the authors remark that if in so-called osteo-arthritis of the knees roentgenography be resorted to after routine fashion the same absence of bony outgrowths will be ascertained with striking frequency save in the more advanced cases. They are led, therefore, to the conclusion that this condition of osteo-arthritis, whether of the hip or knee, is invariably preceded by a long period during which the only local signs and symptoms clinically appreciable are those of villous hypertrophy. In other words, the villous overgrowths being more obstrusive mask as it were the early beginnings of fibrillation in the diseased cartilage.

Diagnosis of osteo-arthritis of the hip in its terminal stages presents no difficulty, but unfortunately at this period in its life history treatment is of little avail. The authors therefore urge that in all cases of so-called sciatica investigation of the movements of the hip should invariably be undertaken, for during the early or preosteophytic phases of the disease there is good reason to believe that the march of the morbid process may be arrested if care be taken to remove any sources of strain on the affected articulation. They indicate the importance of a reduction of body-weight if obese, as undue corpulence is undoubtedly an aggravating factor. Coincidently any static deformity in the lower limb, whether in the direction of flat-foot or possibly inequality in length of extremities, either congenital or acquired—viz., shortening from malunited fracture—should, as far as possible, be corrected so as to diminish any mechanical strain. For the diseased joint itself, when painful or irritable, absolute or relative fixation by some form of ensheathing apparatus is indicated pending the decline of acute symptoms. It should be discarded only during the night and reapplied in the morning after massage, passive movements, and hyperemia or hydrotherapy, with or without thermal douches or hot-air applications, have been practiced.

Practitioner, London

August, XCIII, No. 2, pp. 157-300

25 *Rigor. F. Taylor.
26 *Leukoplakia. A. E. Barker.
27 Dislocations of the Hip. E. M. Corner.
28 Nearthrosis in Ankylosis. A. H. Tubby.
29 Intermittent Pulse. B. T. P. Smith.
30 Review of Tropical Diseases. R. T. Hewlett.
31 *Ringworm of Scalp and Beard. D. Freshwater.
32 Treatment of Rodent Ulcer by Roentgen Ray. C. Kempster.
33 *Advantages of Intubation of Larynx over Tracheotomy in Laryngeal Diphtheria. W. S. Thomson.
34 Treatment of Diphtheria. J. J. Jervis and V. C. Martyn.
35 Cystic Hygroma. L. C. Panting.
36 Perforation of Bladder from Chronic Ulceration, with Secondary Appendicitis. J. B. Pike.

25. **Rigor.**—Occurring in the course of apparent health, if there is no psychical disturbance, Taylor says, rigors suggest the onset of acute illness, as pneumonia or influenza; occurring in the course of a local inflammation, they suggest suppuration; occurring in the course of an apparently general infection, they suggest, but are by no means conclusive of local foci of suppuration. Their occurrence in typhoid fever, and in some cases of malignant endocarditis, shows that the

suppuration need not be there. In cases of gall-stone and renal calculus they are incidental, and have no significance other than that they point to the presence of a source of irritation. They may coincide in time with the maximum of irritation, which just precedes the final passage of the obstructing body. That psychical rigors have some relation to the type of individual is highly probable. The treatment of a rigor is purely symptomatic.

26. **Leukoplakia.**—Barker urges that every patch of this affection should be watched closely, especially if it does not improve under treatment. On the slightest sign of activity in it, free excision should not be deferred. The first sign of cancerous change in such a patch is usually seen in the more advanced degrees. It generally begins as a crack in the white covering or at its ragged border. This fissure exudes blood or serum, and causes pain on movement of the part. It may break under washes, but in any case must be under suspicion whether it does or not. There is usually a feeling of stiffness in the area affected. It has lost its softness and pliancy. In this state it may remain an indefinite time, but sooner or later the neighborhood of the fissure will become indurated; then the crack deepens and widens, and the pain and discomfort increase. On finding this induration around a crack in an old leukoplakia there should be no hesitation in resorting to free local excision. The state of the glands is no criterion. It is a fact based on long experience, that carcinoma starting in leukoplakia has little tendency to spread along the lymphatics; that it is one of those forms of cancer which remain for a considerable time purely a local disease. On the whole it appears to Barker that the very pessimistic views held in some quarters, as to the inevitable transition of leukoplakia into carcinoma, have perhaps been overdone. It is a condition to be watched carefully, and one which justly excites uneasiness; but it is another thing to take it for granted that it is always the precursor of cancer, and to attack it at once by wide-reaching excision of the part itself and of the glands likely to be involved.

31. **Ringworm of Scalp and Beard.**—There are two main methods for the treatment of ringworm: 1. Old method, by means of the local application of a parasiticide. 2. New method, by Roentgen rays. **Old method.**—The hair should be cut as short as possible for at least 2 inches around the infected area. A better plan is to shave the head all over. The head should be washed daily with green soft soap, or an antiseptic shampoo wash, such as,

		gm. or c.c.		
℞	Thymolis	1		gr. xv
	Saponis mollis		or	
	Sp. Vini. Rect.	ana 30		ʒ i

This is allowed to remain some ten to fifteen minutes on the scalp before rinsing off. The hair around the edges of a patch, for at least 1 inch should be pulled out; this prevents spreading by continuity. A good ointment to apply before and during the period of epilation, is

		gm. or c.c.		
℞	Cupri Oleatis	4		ʒ i
	Hydrarg. Oleatis	1	66	gr. xxv.
	Lanolini			
	Ol. Olivae	ana 30		ʒ i

The following prescriptions Freshwater has proved to be efficacious, and, he says, if persevered with, will ultimately lead to a cure:

		gm. or c.c.		
℞	Acid. Salicylic		66	gr. x
	Sulphur. Praecip.	2		gr. xxx
	Adipis	ad 30	or	ʒ i
	Fiat ung.			
		gm. or c.c.		
℞	Sulphur.	4		ʒ i
	Acid. Salicylic			
	Naphthol.			
	Hydrarg. Ammon.	ana	66	gr. x
	Lanolini			
	Paraffin Liq.	ana 30		ʒ i
	Fiat ung.			
		gm. or c.c.		
℞	Sulphur	4		ʒ i
	Acid. Carboli	2	or	♏ xx
	Lanolini	20		ʒ v
	Paraffin Liq.	12		ʒ iii
	Fiat ung.			

The following lotions are also serviceable:

		gm. or c.c.		
℞	Liquor formaldehydi, 40 per cent.	8		ʒ ii
	Aquam	30		ʒ i
		gm. or c.c.		
℞	Acid. Salicylic	2		gr. xxx
	Spt. Lavand.	30	or	ʒ i
℞	Acid. Sulphurous	8		ʒ ii (fresh)
	Aquae	24		ʒ vi
℞	Acid. Picric.	5		gr. viii
	Camphor.	120	or	ʒ iv
	Sp. Vini. Rect.	180		ʒ vi

The lotion should be applied with a brush twice daily for a month, when in favorable cases the stumps will have fallen. In small chronic patches and in the small widely spread patches of a disseminated ringworm, the application of croton oil is a valuable form of treatment. It is best combined with phenol (carbolic acid) or creosote.

	Phenolis (Acidi Carbol)	1	Creosoti	ʒ ii
	Ol. Croton	9	Ol. Croton	ʒ vi
		gm. or c.c.		
℞	Acidi Salicylici	66		gr. x
	Ol. Lavandulae			
	Ol. Bergamoti	ana	33 or	♏ v
	Ol. Olivae	ad 30		ʒ i

Since the introduction of the treatment by means of epilation by Roentgen rays, the cure, even in obstinate cases, has been shortened to a few weeks.

33. **Intubation in Laryngeal Diphtheria.**—Thomson considers that intubation is the better operation because, in the great majority of cases, it is much more easily performed than tracheotomy, no preliminary preparation is needed, no anesthetic is required, skilled assistance is not essential; as there is no cutting, and no subsequent scar, the consent of the parents is readily obtained, the operation can be very rapidly performed, even with the patient in bed, and without good light; in the majority of cases it entirely relieves dyspnea; in those cases in which relief is not perfect it may allow a sufficiency of air to enter. If dyspnea is not relieved, no harm is done. Tracheotomy can then be performed. The after-care, so important in tracheotomy, is a simple matter.

Annales de Médecine, Paris

March, I, No. 3, pp. 253-352

37 The Milk Question in Human Tuberculosis. (Rôle de la tuberculose bovine dans la contamination de l'homme.) A. Calmette.
38 Experimental Research on Transfusion of Blood. E. Bardier and D. Clermont.
39 *Test Induced Diuresis with Abnormally High Blood-Pressure. (Epreuve de la diurèse provoquée chez les sujets atteints d'hypertension artérielle.) J. Cottet.
40 Reinfection with Tuberculosis. E. Rist, M. L. Kindberg and J. Rolland.
41 The Fundamental Clinical Forms of Diabetes. F. Rathery.
42 The Luetin Reaction. E. Joltrain.

April, No. 4, pp. 353-468

43 Modification of the Circulation in Course of Cirrhosis with Ascites. A. Chauffard and D. Routier.
44 *Lesions of the Thyroid with Basedow's Disease. G. Roussy and J. Clunet.
45 Sleeping Sickness. (Etude clinique de la trypanosomiase humaine africaine.) H. Darré.

39. **Test Diuresis with High Blood-Pressure.**—Cottet expatiates on the clinical importance of induced polyuria, viz., the diuresis which follows drinking a pint (600 c.c.) of a mild mineral water in the morning, fasting, and on the clinical importance of the proportion between the amount of urine voided during the night and the day. The normal proportion is about ½. He regards this "rhythm" of the proportional output day and night as of great diagnostic value. Other conditions being equal, this rhythm persists unmodified in the individual case; the amount of urine may vary widely at different times, but the proportion keeps up unchanged. Good effects from a course of mineral waters are possible only when the induced diuresis test shows that the way through the kidneys is open. With a high blood-pressure, neglect to ascertain this may lead to great harm from a course of mineral waters. Persons with arteriosclerosis and kidney disease often drink unusually large amounts of fluids, hoping thus to "wash out the system." If the kidneys are

below par this excess of fluids is not eliminated properly and it gorges the vessels and may do direct mechanical injury. Cottet cites Janeway's statement that 79 of 100 patients with high blood-pressure died with symptoms suggesting chronic kidney disease. Impending uremia is a superposed danger with high blood-pressure, and unless it can be warded off the prognosis is grave indeed. Tests for induced polyuria throw light on the conditions. The special features of the technic and findings of the test were given in THE JOURNAL, 1913, lx, 90.

44. **Lesions of the Thyroid Gland in Exophthalmic Goiter.**—Roussy and Clunet give an illustrated description of the changes they found constantly in the thyroid gland in twelve cases of exophthalmic goiter and never in ordinary goiter or in mere thyroiditis. These lesions are so characteristic, they say, that microscopic examination of a single scrap will serve to differentiate the disease without further data. The changes found suggest that drugs to combat infection, sodium salicylate, quinin, arsenic, mercury, may be useful at first. When the lesions are once established, palliative organotherapy or removal of the thyroid or thymus is indicated unless radiotherapy is given the preference. This acts more like a gradual natural process, and has the advantage that it acts on both thymus and thyroid.

Annales de Médecine et Chirurgie Infantiles, Paris

July 15, XVIII, No. 14, pp. 485-500

46 The Luetin Reaction Less Reliable than the Wassermann in Inherited Syphilis. G. Blechmann, M. Delort and A. Tulasne.
47 *Meningeal Complications of Scarlet Fever. P. Mauriac and P. Philip.
48 Blue Disease with Negative Auscultation. (Cyanose congénitale.) M. Grandjean.

47. Already summarized in THE JOURNAL, Aug. 22, p. 710.

Archives des Maladies du Cœur, etc., Paris

August, VII, No. 8, pp. 497-560

49 *Certain Varieties of Pulsus Alternans. (Variétés du pouls pseudo-alternant. Couples extrasystoliques et alternance. Changement de sens spontanés de l'alternance.) L. Gallavardin and L. Gravier.
50 Technic for Dissection of the Heart to Avoid Injury of Node and Bundle of His. (Techniques autoptiques du cœur.) S. Argaud.
51 *Hematology of Scorbutus in the Adult. J. Heitz.

49. **False Pulsus Alternans.**—Gallavardin and Gravier expatiate on the remarkable light thrown on pulsus alternans by electrocardiography. It has shown that pulsus alternans is produced sometimes by the respiratory movements alone or by extrasystoles. This of course does not have the clinical significance of true pulsus alternans. He gives tracings from a case of false pulsus alternans from what he calls auricular bigeminism and another due to "extrasystolic trigeminism"—both exceptional cases. The tracings from another patient show two or three weak systoles occasionally in the midst of an apparently regular pulsus alternans. This spontaneously upsets the regular alternation. He encountered this in only one case out of fifty examined with electrocardiography and it did not recur during the later examinations in this case. When it happens that the respiration-rate is exactly one-half of the heart-beat, the tracing shows that each second peak is lower than the first; this regular depression of every second peak runs through the tracing unless the breath is held during a few heart-beats. When the respiration is thus shut off, the peaks run regularly at the same height.

51. **The Blood in Scorbutus in Adults.**—Heitz tabulates the blood-findings in a woman who developed scorbutus after prolonged errors in diet. They confirm the findings of the Japanese in thirty-five Russians taken at the fall of Port Arthur, De Albertini's in ten Italians and those of Austregeliso at Rio de Janeiro in thirteen insane persons with scorbutus. The blood-picture does not seem to be much modified by the scorbutus; there is merely a tendency to anemia, with whites somewhat below normal and slight polynucleosis.

Journal de Médecine de Bordeaux

July 26, LXXXV, No. 30, pp. 501-514

52 *Large Trapezoidal Resection of Knee Contracted at Acute Angle. (Ankylose osseuse complète tibio-fémoro-rotulienne.) H. L. Rocher.
53 Habits of Ducks Render Duck Eggs More Liable to Infection Than Hens' Eggs. (Toxicité des œufs de cane.) P. Carles.

52. **Correction of Crippled Knee.**—The stiff knee formed an angle of 55 degrees, but by cutting the tibia and femur nearly straight across, the limb was straightened with merely a shortening of 7 cm.

Presse Médicale, Paris

July 22, XXII, No. 58, pp. 557-564

54 *Radium as Supplement to Operative Treatment of Cancer. (La radiumthérapie métachirurgicale.) F. Jayle.

July 29, No. 60, pp. 577-584

55 *Acute Osteomyelitis of Upper Jaw in the New-Born. A. Broca.
56 Determination of Albumin Content of Urine by Aufrecht's and Tsuchiya's Technics. V. P. Semionov.

54. **Radium as Adjuvant to Operations for Cancer.**—Jayle reports two cases of extensive malignant disease of both ovaries or the uterine cervix in women of 32 and 33 in which he applied radium treatment at once after radical operation and there has been no sign of further trouble during the five and a half and three years since. These were among the first gynecologic cases in which radium was applied. He cites further two cases from Desjardins' service in which over five and three years have elapsed without signs of further trouble although the operative removal of the organs involved was far from complete. In a recent case an absolutely inoperable cervix cancer was modified by seventy hours' exposure to 11 cg. radium sulphate so that it could be safely removed.

55. **Acute Osteomyelitis of the Jaw in the New-Born.**—Broca describes a couple of typical cases of acute osteomyelitis in the upper jaw in quite young infants. He has encountered ten such cases in the hospital and one private case and five died. The swelling and inflammation start in the upper jaw but spread so rapidly to involve the orbit that the trouble is often mistaken for ophthalmia. The bloody-purulent nasal discharge and the signs of severe intrabuccal inflammation and fistulas soon clear up the diagnosis. This is facilitated by the non-involvement of the upper lid in the process and by the serous character of the conjunctival secretion and absence of gonococci. Erysipelas may be suspected at first but the intrabuccal swelling and fistulas and the involvement of the three surfaces of the upper jaw soon render erysipelas less probable. The osteomyelitis in these cases affects the germinal tissue of the two temporary molars. He thinks it is of blood-borne origin, from some general infection, possibly traceable to the umbilicus. The osteomyelitis was installed by the third day after birth in one of his cases, and in Fürst's case a bloody purulent nasal discharge was noted by the eighth day. Nine of his eleven little patients were boy babies.

The septic reaction varies within a wide range and the outcome depends in large measure on the promptness with which the abscess is incised and the posterior portion of the jaw scraped out, bringing away the germinal tissue involved. If there is a suborbital fistula he curets and drains between the skin and the vestibule of the mouth. The child must not nurse for a few days; it is better to draw the breast milk and feed it to the infant. He generally operates under a little chloroform if he deems any anesthetic necessary. In one case the trouble kept up until after a few months a sequester was curetted out. The osteomyelitis of the upper jaw is less tenacious than when the lower jaw is involved. Healing, once started, proceeds rapidly but the destruction of the germinal tissue of the teeth may affect dentition, and it is irreparable.

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Berliner klinische Wochenschrift

July 27, LI, No. 30, pp. 1397-1444

57 *Defective Respiration in Children. (Manifeste und latente Insuffizienz der Exspiration im Kindesalter.) F. Göppert.
58 *Morbid Dread of Blushing. (Erreuthrophobie.) M. Bernhardt.
59 *Sterilization of Vaccines, etc., by Ultraviolet Rays. III. E. Friedberger.
60 Identical Serologic Findings in Twins. (Serologisches Verhalten eines Paares eineiiger Zwillinge.) F. Schiff.
61 Auxo-Action of the Serum. (Auxowirkungen und gebundene Aminosäuren des Blutserums.) M. Jacoby and N. Umeda.
62 *Recovery after Removal of Large Brain Tumor. (Heilung eines bemerkenswerten Grosshirntumors.) W. Alexander and E. Unger.
63 *Friedmann's Treatment for Tuberculosis. (Wissenschaftliche Vorstudien und Grundlagen zum Friedmannschen Mittel.) F. F. Friedmann.
64 *Early Diagnosis of Pulmonary Tuberculosis. E. Stern.

57. **Insufficiency of Expiration in Children.**—Göppert calls attention to a group of cases among children with a chronic or recurring cough in which the lower margin of the lungs is found continuously below the normal level, although neither the clinical manifestations nor the auscultation findings suggest this. By pressing on the ribs to aid in expiration the diaphragm rises to the normal level, showing that there is no mechanical obstacle to normal expiration. The children thus affected are generally of the pronounced exudative diathesis type, that is, with an inborn predisposition to chronic swelling of mucous membranes. Lichtwitz has noticed a similar tendency to insufficient expiration in young adults with constitutional eczema. The cause is probably some impediment in breathing which is overcome in inspiration but hinders expiration, probably some congestion and catarrhal secretions plus possibly a tendency to spasm of the bronchi. A tendency to catarrhal oversecretion plus congenital subnormal elasticity of the lung tissues are probably the main factors involved.

The deficient expiration is fraught with various dangers and must be combated. This can be done only by training the muscles to expel the breath effectually. Even children of 4 or 5 can exercise the muscles in this way, taking a short breath and expelling it slowly and emptying the lungs. Under these exercises extra quantities of sputum are expelled, and frequently a previously intractable cough may be cured by this means. This confirms the existence of catarrhal conditions and shows that such persons are particularly prone to emphysema, etc., and should be watched over with special care. He has the exercises repeated two or three times a day, three deep expirations and then a pause of two or three minutes, repeating this three or four times. At first the expiration must be aided by compression of the chest from the rear by the hands of an adult, also impeding inspiration.

58. **Abnormal Fear of Blushing.**—Bernhardt gives the confessions of two men who suffered so intensely from a tendency to blush on the slightest excuse that one even spoke of suicide. Both were evidently the prey of neurasthenia and were psychopathic. Treatment in such cases, he says, must be mainly psychic, possibly with hypnosis, as adjuvant to drugs to steady the unstable nervous system and physical measures to tone it up in general.

59. **Sterilization by Ultraviolet Rays; Especially after Spraying with Stain.**—Friedberger's further research, he states, has confirmed his previous announcement that vaccine can be sterilized in thirty minutes, without impairing its potency, by exposure to the ultraviolet rays. He also reports tests of the influence of these rays on amboceptor, complement and antigen separately. Bacteria in urine and blood seem to be protected against the ultraviolet rays unless sensitized by 1 to 100,000 or 1 to 1,000,000 eosin solution. This same favoring influence from eosin sensitization was observed also in experimental infection of the interior of the mouth treated by exposure to the ultraviolet rays or direct sunlight. The bacteria in the mouth were killed off so promptly and constantly that he thinks this method of radiotherapy after sensitization with a stain offers an encouraging prospect for treatment of throat affections in human beings and to sterilize bacillus-carriers. During the exposures he sprayed the region repeatedly with the eosin or fuchsin I to 100,000 solution.

62. **Recovery after Removal of Brain Tumor.**—Alexander and Unger report a case of a large encapsulated tumor in the upper half of the posterior central convolution removed at one sitting under local anesthesia with complete recovery for the six months to date. At the age of 22 the previously healthy young man began to have epileptic seizures but the aura was usually long enough to permit him to stuff a handkerchief in his mouth to protect his tongue. He was under specialist medical care for four years and not until after this interval did symptoms develop pointing to a brain tumor. Even then the symptoms were mild in comparison to the size of the tumor; it was shown up well by the Roentgen rays. It extended into the lateral ventricle and the only defect left from its removal is a pure stereognosis, that is, loss of power to recognize objects by touch. Otherwise there seems to be complete recovery. The tumor must have grown very slowly and it already showed signs of calcification when exposed. The young man was conscious during the entire operation, even for a whole minute during which respiration was arrested, but he suffered no pain. A photograph shows the excised tumor implanted in a brain taken from a cadaver.

63. **Friedmann's Remedy for Tuberculosis.**—Friedmann devotes nearly nine pages to his description of his preliminary experimental work and the bases for his method of treating tuberculosis. He reaffirms that it should be used as a protecting vaccine for children in a tuberculous environment, and reiterates that its harmlessness for man is shown by the case-histories that have been reported.

64. **Early Diagnosis of Pulmonary Tuberculosis.**—Stern emphasizes the importance from this standpoint of a tendency to anemia, dyspepsia, diarrhea, tachycardia, especially paroxysmal tachycardia, and slight enlargement of the heart dulness toward the right; also pains in the shoulder or abdomen may suggest primary or secondary pleurisy of tuberculous origin. Another significant finding is a paresis of the vocal cord on the side of the lung lesion, associated with slight chronic laryngitis. He calls this the larynx sign of early pulmonary tuberculosis and advises direct visual inspection to detect it when there is a sensation of vague oppression in the chest, a tendency to rheumatic pains, slightly irregular breathing, or dyspepsia. The entrance to the throat is moderately red and the paralyzed vocal cord is also red. There is always more phlegm on the paretic cord than on the other, and its inner margin is usually irregular in outline. There is slight hoarseness, particularly at night, and the patient hawks often but raises very little sputum and tubercle bacilli cannot be found at this early stage. As the pulmonary process progresses or subsides, the throat findings become modified to correspond.

The pupil of the eye on the side affected is often more dilated than the other and the reaction to light is more sluggish. The musculature on this side is often less well developed, but this is not a consequence of but merely a predisposing factor to the tuberculous focus. The lagging behind of one-half of the chest in the excursion of the thorax is a sign of trouble within, usually involving the pleura. Nearly all the foregoing symptoms can be traced to pressure on nerves by enlarged bronchial lymph-glands. By heeding these signs we can recognize the tuberculosis even before the lung has become involved in the process to any extent.

Deutsche Zeitschrift für Chirurgie, Leipzig

June, CXXX, Nos. 1-2, pp. 1-224

65 *Meningitis After Subcutaneous Injuries of the Skull and Spine; Two Cases with Recovery. F. Markull.
66 *Operative Treatment of Wandering Kidney. H. Tichy.
67 *Primary Round-Cell Sarcoma in Both Kidneys in Girl of 8. H. Schwers and A. Wagner.
68 *Fibrous Ostitis with Intra-Uterine Fracture. E. Stierlin.
69 *Crushing of the Wrist. (Der Kompressionsbruch und die traumatische Erweichung des Mondbeines.) G. Guye.
70 *Operative and Mechanical Treatment of Pulmonary Tuberculosis. (Die 1911 und 1912 mit der Wilmsschen Pfeilerresektion behandelten Lungentuberculosen.) A. Meisel.

65. **Meningitis After Contusion of Skull or Spine.**—Markull summarizes from the literature several typical cases of serous, purulent or tuberculous meningitis developing apparently in connection with a trauma. He follows them with two cases from his own practice in which purulent spinal meningitis set in about the sixth day after a fall injuring both skull and spine and followed by unconsciousness for a time. The skin was not broken in either case but one of the men had had a boil on the neck incised about two months before. No streptococci or staphylococci could be cultivated from the spinal fluid in either case. A few Jaeger's cocci were found in one. The purulent meningitis in this case subsided under lumbar puncture twice repeated; 15 c.c. and 10.5 c.c. of the fluid were evacuated with a fifteen-day interval and relief was apparent at once. The pains and hyperesthesia were so intense in this case that morphin was required. The fever was intermittent, reaching 38.7 C. at times; pulse down to 64, but no paralysis. The other patient had fractured his skull but the meningitis seemed to be limited to the spinal region. Only briefly transient relief was obtained by lumbar puncture and laminectomy was then done with excellent outcome, complete recovery soon following. Laminectomy solely to drain the subdural space has only rarely been done, but the success in this case encourages resort to it when the symptoms persist practically unmodified by lumbar puncture and the at first merely serous or seropurulent exudate becomes more exclusively purulent.

66. **Movable Kidney.**—Tichy reviews the various methods for correction of a wandering kidney, citing 461 articles bearing on the subject. His conclusions are in favor of suspending the kidney from the twelfth rib by means of a ring formed from its periosteum. This proliferates to form an adequate support which interferes less with the functioning of the kidney than any other material that can be used for the purpose. He found it far superior to fascia for the purpose.

67. **Sarcoma of Both Kidneys.**—A few months after measles, diplococcus pleurisy and scarlet fever in quick succession, a tumor developed in each kidney without fever or spontaneous pain and no blood in the urine until toward the last. There were scarcely any signs of uremia and the rapid debility suggested malignant disease, as also the rapid growth of the tumors followed by a subsidence in size as part of the tumor broke down.

68. **Congenital Fracture.**—Stierlin reports a case in which the bones of the right leg at one point were of defective structure at birth and fractured in the uterus. The experiences with similar conditions as reported by others are not encouraging, but Stierlin succeeded in healing the fracture and producing an apparently normal limb by a plastic operation with pedunculated flaps of periosteum and a long ivory peg sharpened at both ends run up into the bone marrow of each stump of the two bones. The microscope showed that the bone marrow participated in the fibrous transformation and thus its removal was called for. Consolidation was not complete until the child was in its second year and plaster dressings and splints had been perseveringly applied. Roentgenoscopy three years after the operation confirms the perfect healing. This leg now is only 1 cm. shorter than the other.

69.—**Traumatic Softening of Semilunar Bone of the Carpus.**—Guye has encountered seven cases of contusion of the wrist in which the symptoms were at first those of an ordinary sprain, pain, swelling and inability to use the joint. Only the tedious persistence or frequent recurrence of these symptoms suggests that anything is seriously wrong. When the pain is localized in the dorsal side of the semilunar bone there is reason to suspect isolated traumatic injury of this bone with changes in its structure, permanently crippling the hand. The semilunar bone was broken into two or more pieces in two of his cases and he removed them. The aftercare had to be scrupulously vigilant to ward off deformity of the wrist, but excellent final results were attained in these cases. In others, the bone softened, without actual fracture. With this no operation is required, merely measures to stimulate the repair of the bone, massage, hot air treatment, and possibly injection of 1 or 2 c.c. of a 1 or 2 per cent. solution of phenol. Only when the disturbances progress under these measures should operative treatment be considered; it should always be followed by prolonged and systematic after-care.

70. **Resection of Ribs to Immobilize Tuberculous Lung.**—Twenty-four patients with pulmonary tuberculosis have been treated by Wilms' method of resecting ribs over a long vertical stretch so that the chest wall retracts and sinks in. Judging from the experiences related, no other method to induce the collapse of the lung is as effectual as this "pillar resection." The bacilli disappeared permanently from the sputum in the five cases with positive findings at first.

Gazzetta degli Ospedali e delle Cliniche, Milan

July 23, XXXV, No. 88, pp. 921-928

71 Agglutination in Jaundice a Sign of Complicating Typhoid. (La sieroreazione di Grueber-Vidal negli itterici.) S. Mazza.

July 26, No. 89, pp. 929-944

72 *Infantilism, Fat Deposits and Genital Dystrophy with Tumor of Hypophysis. (Infantilismo e sindrome di Fröhlich da tumore dell' ipofisi.) C. Viscontini.

72. **Tumor in Hypophysis.**—Viscontini operated solely to relieve pressure from a tumor in the pituitary body of a young man of almost dwarf-like stature with symptoms suggesting trouble in this region. In the last few months there had been convulsions, intense headache and loss of vision. Viscontini thinks that this is the first case published of extensive resection of the skull for this trouble, and it was successful far beyond his highest anticipations. The trouble evidently was not malignant but otherwise he knows nothing of its nature beyond the Roentgen findings of enlargement of the sella turcica and the signs of pressure. He did not attempt a preliminary test thermoreaction with hypophysis extract fearing to aggravate the febrile condition, high blood-pressure and abnormally slow pulse. His aim was merely to relieve the pressure which he accomplished by cutting a 12 by 15 cm. horse-shoe flap in the skull, extending from the temporofrontal to the temporo-occipital region, the convex margin two finger-breadths from the axial line. Turning back the bone-periosteum flap, he cut out an oval stretch of the dura and as the cerebral fluid escaped the protruding brain subsided. After careful hemostasis he replaced the flap and sutured the skin, the total operation requiring only thirty-two minutes. By the third day vision was much improved and by the tenth the young man was reading the newspaper. In the five months since he has grown 2 cm. in height and increased by 2 kg. in weight and is free from all disturbances.

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July 26, XXI, No. 30, pp. 1073-1108

73 *Operative Treatment of Purulent Pericarditis. M. Francini.

73. **Purulent Pericarditis.**—Francini reports a case in a previously healthy woman of 18; the acute pericarditis was well under way when symptoms of acute articular rheumatism developed, contrary to the customary sequence. High fever, dyspnea and cyanosis had developed in the course of a few days, suggesting pneumonia until the signs of a large effusion in the pericardium became evident. Puncture revealed pus and the fifth costal cartilage was then resected, permitting access to the pericardium. Fully a pint of pus was evacuated and the wound was drained with a tube; this soon became obstructed and was replaced with a capillary drain which answered ideally the desired purpose. The patient was discharged completely cured by the end of a month. The diagnosis was facilitated by the shifting about of the fluid in the pericardium on change of position. The operation was done under a few whiffs of ether, Francini dreading possible complications with local anesthesia.